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**IVORY
AND
THE ELEPHANT**





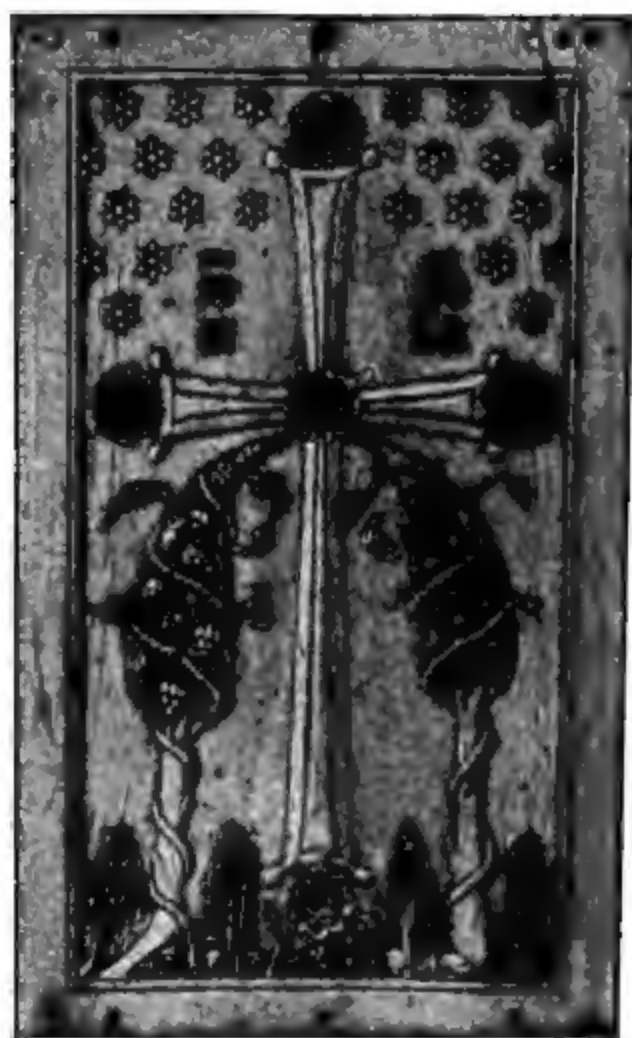
TRIPTYCH

ITALIAN WORKMANSHIP; XV CENTURY. THE VIRGIN ENTHRONED, SCENES FROM THE GOSPELS
ST. PETER AND ST. FRANCIS AT THE LEFT, ST. BERNARD AND ST. DOMINIC AT THE RIGHT.

MUSÉE DU LOUVRE

I V O R Y
AND THE ELEPHANT
IN ART, IN ARCHAEOLOGY, AND
IN SCIENCE

BY
GEORGE FREDERICK KUNZ, PH.D., Sc.D., A.M.



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AS A TRIBUTE OF ADMIRATION
AND REGARD

304755

AUTHOR'S PREFACE

THE publication of a new book on ivory may seem not only uncalled for, but even in some degree presumptuous, when so many excellent works are already at the disposal of those who wish to acquire some knowledge of this interesting subject.

To mention only a few of the leading writers on this theme, we have the attractive and comprehensive book entitled "Ivories" by Alfred Maskell,* and the masterly volume by Émile Molinier, "Les Ivoires," forming part of his work "Histoire générale des arts appliqués à l'industrie."† Another work, one that is perhaps less widely known to the general reader, is J. O. Westwood's "Descriptive catalogue of the fictile ivories in the South Kensington Museum."‡ This scholarly treatise is in many ways a fit companion to the studies of Maskell and Molinier, for as Westwood includes in his survey the large collection of castings in the South Kensington Museum, his book is exceedingly comprehensive. Another writer who has done splendid work in this field is the German, Hans Graeven, whose choice selection of photographs of the most representative ivory carvings in various countries, as well as his numerous special articles on the

*Alfred Maskell, "Ivories," London, Methuen & Co. [1905], xii, 444 pp., 88 pl., 4to (Connoisseur's Library).

†Émile Molinier "Les Ivoires," Paris [1896], 245 pp., ill., pl., folio; Vol. I of his "Histoire générale des arts appliqués à l'industrie."

‡J. O. Westwood, "Descriptive catalogue of the fictile ivories in the South Kensington Museum, with an account of the Continental collections of classical and medieval ivories," London, 1876, 24 photos, 9 woodcuts, imp. octavo.

subject, have done so much to enlist public attention and interest.*

In citing these few names from among those of the many able writers who have treated of the artistic use of ivory, we have merely aimed to indicate some of the more exhaustive or better known literature, and must refer those seeking for detailed information to the catalogues of the principal libraries. The splendid lecture by Sir Richard Owen, delivered before the London Society of Arts in 1856, contained much of value and interest.

While admitting the unquestionable excellence and authority of these and similar works, the writer of the present book has long felt that it would be possible to accomplish something in this field upon combined and yet different lines. The art of ivory carving and the beautiful productions of this art have been most satisfactorily presented, but it remains possible to enlarge the scope of our investigations so as to combine with the purely esthetic side of the subject a study of the sources of this fascinating material as well as of its physical characteristics. In this connection data regarding the history of man's knowledge of the elephant, and of the methods followed by the elephant hunters of various times and lands, will better enable us to realize the fact that we owe our pleasure in viewing some masterpiece of ivory carving not only to the artist's skill, but also to the arduous and often perilous task of the elephant hunter whose activities have supplied the beautiful pearl of the forest.

If we are able to add to this some information regarding the evolution, distribution, and habits of the elephant, we shall have made a distinct gain, for our intelligent appreciation of the final results of any exercise of human endeavour is always broadened and deepened by an adequate knowledge

*Hans Graeven "Frühchristliche und mittelalterliche Elfenbeinwerke in photographischer Nachbildung: Aus Sammlungen in England," 1898, "Aus Sammlungen in Italien," 1900, and a large number of papers in various periodical publications.

of the many stages leading up to such a final result. Indeed it is only those who have trained themselves to comprehend and appreciate all the manifold factors that go to make up any finished product of human skill or genius who can really enjoy it and profit by it.

If in the present book the writer has in the slightest degree attained the aim he set for himself in its composition he will feel himself amply repaid for the time and pains bestowed upon it.

As this volume is more extensive in its scope than a work devoted exclusively to Ivory, it was necessary to consult authorities covering a wide field. In this connection it gives me pleasure to acknowledge my obligation to those whose courtesies have enabled me to add so much that would otherwise be difficult of access or impossible to obtain and would never have been printed.

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Now in the American Museum of Natural History, New York

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Collection of Hon. Charles H. Morrill

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In Position in Loess Bank, Campbell, Franklin County, Nebraska.

THE TWO LARGEST TUSKS IN THE WORLD

One, Weighing 226 Pounds, Is Now in the British Museum.

TUSKS OF A SOUDANESE ELEPHANT

A Record Pair of Tusks Presented to the New York Zoölogical Garden by
the Late Charles T. Barney.

HUGE ELEPHANT

Brought Down by a Well-aimed Shot by Carl E. Akeley.

ACACIA TREE OF FIFTEEN INCHES DIAMETER

Broken Down by an Elephant. Courtesy of Carl E. Akeley.

FOSSIL ELEPHANT TUSKS

From the Lena River, Siberia.

A FORTUNE IN IVORY

Each Tusk Worth \$50 to \$100: Zanzibar.

JAGGING WHEELS

Made by Sailors from Whale Teeth or Walrus Tusks.
Old Dartmouth Historical Society, New Bedford, Mass.

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**IVORY
AND
THE ELEPHANT**

CHAPTER I

PREHISTORIC AND ANCIENT CARVED IVORIES

THE employment of ivory in the production of ornamental objects dates back to the very earliest times. In the cave dwellings of Le Moustier and La Madeleine in the Dordogne, France, and in the lake dwellings of Switzerland, some ivory objects and many of reindeer horn, carved and incised with a remarkable degree of artistic skill, have been discovered. The ivory used ornamentally at this remote period almost certainly came from dead animals, as does a very considerable part of the African ivory imported to-day. This easier means of obtaining it was undoubtedly then as now a great factor, and while the specimens preserved for us do not offer any special indications as to the reasons governing the choice of this material, we may well suppose that not only its rich-toned, smooth surface, but also the graceful curve of the tusks were determining considerations. More especially the latter must have appealed to the instinctive appreciation of primitive man for what Hogarth has called the "line of beauty," and this is manifest in the fondness of most primitive peoples for curved horns of various kinds as objects upon which to bestow their skill, much or little, in ornamental design. We must always bear in mind, however, that what we are pleased to call "primitive man," when he had reached the rudimentary civilization of the cave and lake dwellers of France and Switzerland, had advanced, qualita-

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tively, as far above the earliest stage of the human race as the member of the most highly civilized race of to-day stands above him.

Of all relics of the past, none can be said to vie in importance for the history of ivory with the rude outline of a mammoth sketched upon an ivory plaque, over nine inches long, by the hand of a prehistoric inhabitant of the cave dwellings of La Madeleine, in the valley of the Vézère, commune of Tursac (Depart. Dordogne), France. This unique piece was discovered in May, 1864, by Falconer and Lartet, and is now in the Muséum National d'Histoire Naturelle (Jardin des Plantes), Paris. It was described and figured in the *Reliquiæ Aquitanicæ*, published by Lartet and Christy, and also in the *Revue Archéologique*, Vol. II, p. 245.

Some very interesting details have been communicated to the writer by M. Stanislas Meunier, Director of the Museum. He states that the plaque was handed to him personally in 1869, by M. Lartet, and that he well remembers the words in which the fortunate discoverer expressed the surprise and joy he had experienced in finding that some ivory fragments scattered on the floor of the cave fitted into one another, and when properly adjusted, offered the portrait of an elephant with long hairy fur. From an archaeological point of view the reproduction of the photograph sent by M. Meunier is of considerable importance, as the illustrations heretofore given were derived from a sketch made on the spot by M. Lartet at the time of his discovery, and which was intended to bring out and emphasize the rude scratchings of the primitive artist, as an aid to those who might not have the requisite time to study the original carefully enough to see the design distinctly.

At the Congrès International d'Anthropologie et d'Archéologie Préhistoriques, held at Monaco in 1906, Doctor Capitan showed a most interesting ivory relic of the age of the cave



SLAB OF IVORY ETCHED WITH A FIGURE OF A HAIRY MAMMOTH
BY ONE OF ITS HUMAN CONTEMPORARIES OF PREHISTORIC TIMES. FROM LA MADELEINE, VALLEY OF THE VÈZÈRE, DORDOGNE, FRANCE.
FOUND IN 1869 BY MONS. LARTET.
3 DIAM. MUSEUM D'HISTOIRE NATURELLE, PARIS

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dwellers. This was a large segment of a mammoth tusk bearing two deep and broad grooves. The piece of ivory measured 40 cm. in length and from 15 cm. to 20 cm. in width, and the grooves, evidently made by a graving tool, marked out a part of it 35 cm. long and from 3 to 4 cm. wide, running to a point at the end. The grooves were so deep, that only a slight shock would have been needed to detach the piece within them and thus secure a fine ivory poignard. This precious relic of ivory working in the far distant past was found by M. Galou under a loosened rock at the entrance of the Gorge d'Enfer, and Doctor Capitan conjectures that the carver may have been surprised by the avalanche that brought down the rock, and in his haste to escape, have cast away his nearly completed work.* It is assigned to the so-called Magdalenian period, that of the cave dwellers of La Madeleine.

Doctor Capitan believes that all this prehistoric ivory work was done either in the manner above indicated, or by thinning the piece of ivory by means of repeated percussion. He states that the saw does not seem to have been used at this early date, appearing only in the later reindeer period.

A prehistoric ivory carving of surpassing interest and importance is the headless and imperfect figure of a woman carved out of mammoth ivory, and found in the Grotto du Pape, Brassempouy (Dept. Landes), France; this has been called the "Venus of Brassempouy." It accentuated rudely, and even coarsely, the female torso, and may have had some connection with a worship of the reproductive powers of nature.† Another female figure, with a similarly exaggerated outline, lying on the ground beneath a reindeer, is

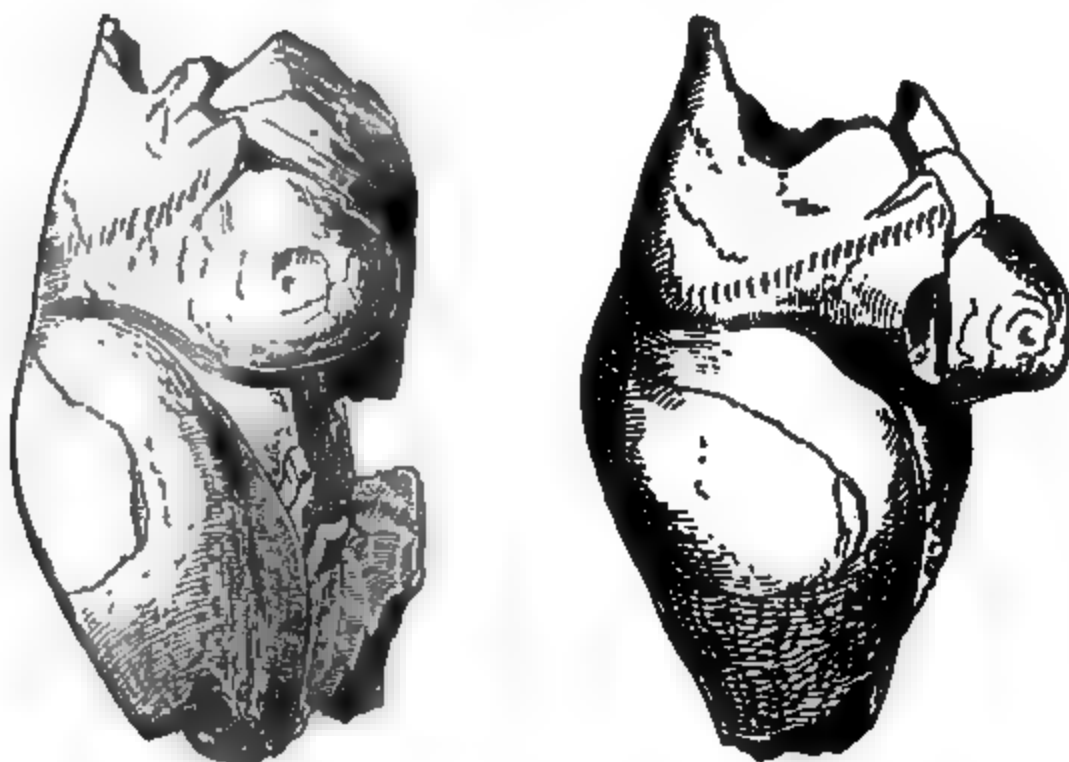
*Congrès International d'Anthropologie et d'Archéologie Préhistoriques; Compte Rendu de la treizième session, Monaco, 1906, Vol. I, pp. 404, 405, Monaco, 1907. This ivory has never been published.

†George Grant McCurdy, "Recent discoveries bearing on the antiquity of man in Europe," in Smithsonian Institution, Annual Report for 1909, pp. 531-583; see pp. 539-540.

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carved in a piece of that animal's antler, and was unearthed at Laugerie-Basse. On the wall of the cave of Les Combarelles, Dordogne, are engraved as many as fourteen representations of the mammoth, much more realistically portrayed than in the rude etching of this animal noted above. The effect of many of these cave incisions was emphasized by darkening the outlines with oxide of manganese.*

The "Grotto du Pape" furnished, in 1897, another even more important specimen of the plastic art in ivory of primi-



PREHISTORIC IVORY CARVING, called the Venus of Brassempouy. Found at Brassempouy-en-Chalosse, in the "Grotto du Pape." Front and side views; natural size. From M. Hoernes, "Urgeschichte der bildenden Kunst in Europa," Wien, 1898.

tive man. This is also the figure of a woman, of which only the torso and one of the thighs remain. The modelling here is superior to that of the so-called "Vénus de Brassempouy," the ungraceful exaggeration of this figure not appearing in the more recently discovered sculpture.† Perhaps even

*Ibid., pp. 540; 552, Figures.

†Hoernes, "Urgeschichte der bildenden Kunst in Europa," Wien, 1898, pp. 686, 687, Pl. II, Figs. 11-13.

more interesting and significant is a curious sculpture in ivory unearthed near Brünn, in Moravia. This was found at a depth of over four metres in the loess, together with the bones of a rhinoceros, a mammoth tusk a metre long, and a human skull. The ivory sculpture, which must when complete have measured 22 or 23 cm. in length, represents the naked figure of a man; the legs had disappeared, but the head, with its pronounced orbital arch, broad, nasal orifice, and long chin, bears a striking resemblance to the features of the human skull found in the same place.*

One of the most interesting and important discoveries in prehistoric art, for which the mammoth furnished the material, was made on October 3, 1913, at La Colombière, near Poncin (Dept. Ain), France, by M. Jean Pissot.† In excavating an "upper Aurignac" deposit there was brought to light what the finder terms "a veritable *atelier*," embracing engraver's tools of various types and numerous specimens of the material on which he worked. The object of prime importance was a plaque, either from the shoulder plate or the thigh of a mammoth, on which are engraved two human figures, a man and a woman. This is asserted to be the only example so far discovered of an engraved representation of Quaternary man. The head of the man, figured in profile, is the more clearly defined, and is described by M. Pissot as differing absolutely from the so-called "Neanderthal type." The head is large, with a bulging forehead; the face is long and markedly prognathous. The chin is prominent and bears a short beard, indicated by a number of fine scratches; the eye is figured by two curved lines. The hairiness of the body is strongly indicated. The female form has not the

*Ibid, p. 60, Figs. 14, 15 (p. 59).

†MM. Lucien Mayet and Jean Pissot, "Découverte d'un os de Mammouth gravé avec figurations humaines, dans le gisement aurignacien supérieur de La Colombière, près Poncin (Ain)," in *Comptes Rendus de l'Académie des Sciences*, Vol. 157, pp. 655-658. No. 16, October 20, 1913.

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peculiarly exaggerated outline shown in the ivory sculptures of Brassempouy and in some similar prehistoric sculptures, but still the figure is to a certain extent steatopygous. The dimensions of this unique plaque are 15 by 17 cm.

There are in the Petrie Collection several specimens of prehistoric Egyptian ivory carving. In the earliest work here, the form of the tusk was modified but little, or not at all. Exceedingly curious are some rude reproductions of the human form, where the head alone is more or less clearly figured. Two of them show bearded heads bearing a striking resemblance to those engraved on the most archaic of the Babylonian cylinders, a fact which might be taken to indicate that the same or a closely related race evolved the first important elements of civilization, both in Mesopotamia and in the Nile Valley. These early Egyptian carvings are assigned by Mr. Petrie to some time during the long prehistoric period from 8000 to 5500 B. C., and he believes that they belong to the earlier part of this period.

Of the ivory work of historic times in Egypt, no single specimen is more valuable than the tiny head of the great pyramid builder, Khufu, of the Fourth Dynasty, now in the Boulaq Museum, Cairo. Although measuring but a quarter of an inch in height, the features are strongly and firmly marked, and we have good reason to think that the old-time carver has successfully executed his task as portraitist.

Toward the end of the pre-dynastic period in Egypt ivory carving of marked excellence appears, revealing a decided advance upon earlier work. A large mass of specimens of this work was unearthed at Hierakonopolis in a trench six feet long; these comprised statuettes of men and women, as well as carved tusks, wands, and cylinders. Although the ivories of this period and of the early dynasties are decidedly artistic in execution, it has been remarked that Egypt never



VOTIVE HEAD REST
EGYPTIAN ART, III TO II CENTURY, B. C.

CHAIR-FOOT
IN THE SHAPE OF A HIPPOPOTAMUS HOOF, AND TWO STATUETTES OF FAVORITES
OF THE DECEASED FROM AN ANCIENT EGYPTIAN TOMB.

MUSÉE DU LOUVRE



I. VOTIVE CASTAGNETS

ART OF FIRST THEBAN EMPIRE. TO THE RIGHT POLISHERS. FROM HECATOMISOLIS
MUSÉE DU LOUVRE

II. EGYPTIAN IVORY WAND

PUBLISHED BY THE COURTESY OF THE METROPOLITAN MUSEUM OF ART

III. IVORY STATUETTES

GRECO-IONIC ART OF THE VII OR VI CENTURY B. C.

MUSÉE DU LOUVRE

seems to have produced a school of ivory carving, properly so-called, as China did. The Egyptians appear to have treated this material as they would and did any other, without particular consideration of its peculiar qualities. A still further advance in technical and artistic skill characterizes the ivory work of the First Dynasty, and a quaint but thoroughly representative specimen of the ivory carver's art at this period is the figure of an old king found at Abydos, and now in the British Museum. The senile droop of the head and neck, the intelligence, one might perhaps better say the shrewdness, marking the face of the aged sovereign, make this a really fine portrait study in spite of its restricted dimensions.*

The head of an Egyptian king, carved in ivory, was exhibited at the Burlington Fine Arts Club in 1879. It had been bought of an Arab at the Tombs of the Kings, Thebes, and from its close resemblance to the celebrated carved wooden statue from Sakkarah, now in the Boulaq Museum, and to which a date of circa 4000 B. C. has been assigned, there is some reason to believe that this may be one of the very early specimens of Egyptian work in ivory. The beard is formed of ebony wood, and a small piece of this wood has been inserted at the top of the skull, to represent the opening made for the extraction of the brain in the embalming process.† This work was, when exhibited, in the possession of Mrs. Blood.

Two fine specimens of the so-called "magical wands" were recently offered for sale in London at the disposal of the Hilton Price Collection there in July, 1911. The larger of these measured $14\frac{1}{2}$ in. from end to end and was about 2 in.

*W. M. Flinders Petrie, "The Arts and Crafts of Ancient Egypt," London, 1909, pp. 31, 32, 134 (see Fig. 21, opp. p. 32).

†Burlington Fine Arts Club, Catalogue of Bronzes and Ivories of European Origin, exhibited in 1879, London, 1879, p. 48; Cabinet VII, No. 290.

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wide. On its upper rounded surface were somewhat roughly incised figures of a crocodile, of a toad sitting on a basket, of the divinity Ta-urt, of a winged man, of a sphinx, etc. This wand or staff came from Thebes, and had been broken and repaired in ancient times. The other smaller specimen, $9\frac{1}{2}$ in. long, had its point roughly cut to represent a bearded head. It came from Naqada and is attributed to the pre-historic period of Egyptian civilization.*

Another interesting ivory in the Hilton Price Collection was a scribe's palette of the Eighteenth Dynasty, an inscription stating that it had been made for Tehuti-mes, Chief of the Royal Scribes [of Amenophis I]. Two deep holes at one end of the palette evidently served to contain the red and black paints used in forming the Egyptian characters, for traces of these paints were still visible. In a groove hollowed in the centre must have rested the reed pens which were employed by scribes of this age. This object is $13\frac{1}{8}$ in. long and $1\frac{3}{8}$ in. wide; it is in a fine state of preservation and is said to be a unique specimen of its kind.†

Some curious ivory rods were unearthed by Prof. Flinders Petrie in 1895, between Ballas and Naqada, about thirty miles distant from Thebes. These and other objects found here are conjectured by Professor Petrie to have been the work of a primitive Lybian tribe and to date from about 3000 B. C. There were also five small figures in ivory, four of lions and one of a hare. The rods, several of which are now in the Museum of the University of Pennsylvania, may possibly have been used as divining rods, or perhaps were pieces for some game; they came from a single tomb. They measure $5\frac{2}{3}$ in. in length, some of them being incised with diagonal

*Catalogue of the Collection of Egyptian Antiquities, the property of the late F. G. Hilton Price, Esq., London, 1911, p. 113.

†Catalogue of the Collection of Egyptian Antiquities, the property of the late F. G. Hilton Price, Esq., London, 1911, p. 112.

lines, but most of them cut to represent jointed canes or straws.*

In the Cairo Museum are a few ivory amulets, three of them figuring serpents' heads, the carving being very rudely executed. These are small objects measuring respectively 55 mm., 59 mm., and 49 mm., or from $1\frac{3}{4}$ to $2\frac{1}{4}$ in.†

Early Egyptian ivory carving is represented in the Metropolitan Museum of Art, New York, by several characteristic examples. The finest and the best preserved are two pieces which probably formed the feet of a state chair, a throne, or a couch. They are shaped into the form of the hoof and ankle of bulls' legs. The ivory is in appearance as fresh as though only recently worked, although these specimens, found at Abydos, are attributed to the period of the First or the Second Dynasty (about 3400 B. C. or 3000 B. C.). Much less well preserved, but even in its present deteriorated condition showing the work of an artist's hand, is the small figure of a lion, considered to be a carving of the First Dynasty (about 3400 B. C.); this came from the old Osiris Temple at Abydos (Thebes). Another ivory, from the same early period, and equally deteriorated by long exposure to injury either by soil or weather, is a female figure, the lower part of which has been broken away; this was also brought from the ruins of the Osiris Temple at Abydos. With this minute figure as well as with that of the seated lion, time has dealt so unkindly that the ivory has lost all its beauty of hue and smoothness, and at the first glance one would suppose that wood was the material employed.

While the old Assyro-Babylonian civilization goes back as far as that of Egypt, the facilities for securing ivory were

*Stewart Culin, "Chess and Playing Cards," Washington, 1898, pp. 812, 814, Figs. 132, 133, 134; pp. 665-942 of Rep. of U. S. Nat. Mus. for 1896.

†G. A. Reisner "Catalogue générale des antiquités égyptiennes du Musée du Caire," "Amulets," Le Caire, 1907, pp. 38, 39; Nos. 5481, 5482, 5492.

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dependent upon the gradual development of active commercial intercourse with the latter country, and even the oldest ivories of Sumerian origin belong to a later period than that to which the earliest Egyptian works have been assigned. The style of art in the Assyrian ivories clearly shows that its inspiration came from Egypt, as is apparent to any one who views the exceptionally fine collection of them in the British Museum; quite possibly Phœnician artists served as intermediaries in this branch of art as in so many others. One of the most carefully executed is a small panel, on which is carved the representation of an Egyptian king holding in one hand a lotus. Another is very finely carved with sphinxes in relief. Then we have, on still others, the face of a woman looking out of a window, the representation of a sacred tree, etc. Some of these works may have been done by Assyrian artists, and others by Egyptians or Phœnicians.

These Assyrian ivories were found by Layard in 1845, in what he conjectured to be the treasury of the North West Palace at Nimroud.* The thirty-three objects figured are now in the British Museum.† All of them were in poor condition when found, owing to the drying out of the gelatinous part of the ivory in the lapse of twenty-eight centuries. They were also so firmly embedded in the earth that great precautions had to be taken in detaching them. However, on their removal to the British Museum their oily content was so skilfully restored by means of an ingenious process that they are now in quite satisfactory condition. Layard was uncertain whether the objects originally formed the decorations of a chest, a throne, or of the walls of the cham-

*Sir Austen Henry Layard, "Nineveh and Its Remains," 2d. ed, London, 1849, Vol. I, p. 29; Vol. II, pp. 9 sqq.

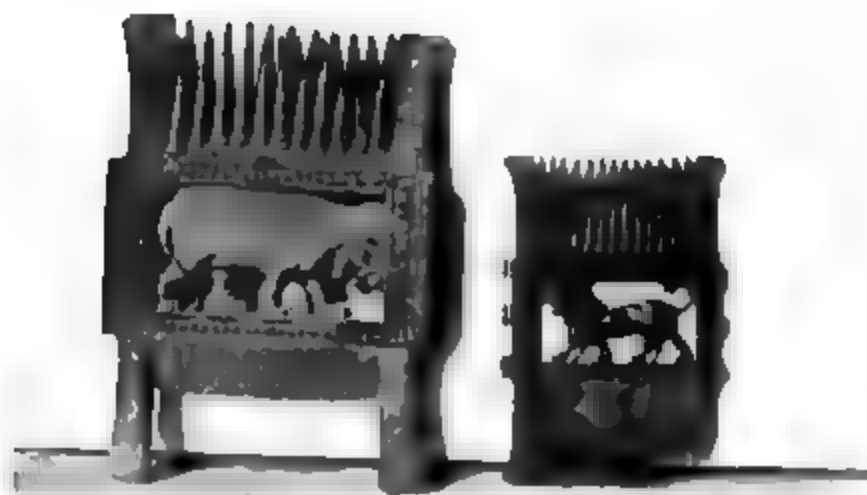
†Layard, "The Monuments of Nineveh," London, 1849 (1st Series), pp. 19, 20, and Plates 88-90.



ASSYRIAN IVORIES, 900 B. C.

- I. HEAD OF A BULL.
- II. PANEL CARVED TO REPRESENT A WINDOW AT WHICH A WOMAN IS LOOKING OUT.
- III. SMALL PANEL CARVED IN RELIEF WITH THE FIGURE OF AN EGYPTIAN KING HOLDING A LOTUS.
- IV. PORTION OF A PANEL OR ORNAMENT CARVED WITH THE FIGURE OF A SPHINX.

BRITISH MUSEUM



I. IVORY COMBS

ASSYRIAN OR PHOENICIAN WORK; IX TO VII CENTURY B. C.

MUSÉE DU LOUVRE



II. ASSYRIAN OR PHOENICIAN STATUETTES

IX TO VII CENTURY B. C.

MUSÉE DU LOUVRE

ber in which they were discovered. A date of about 980 B. C. was proposed by him for these remains.*

A most interesting piece is a complete panel 9 in. long and 6 in. wide, carved with two seated divinities adoring a cartouche with Egyptian hieroglyphics, supposed to signify the name of an Assyrian deity or king; above is a disk with plumes. The dress and general appearance of the figures and the whole style of composition point to Egypt, although certain details are believed to indicate that this may have been the work of an Assyrian, or more probably of a Phoenician artist.†

In the annals of Tukulti Ninip, King of Assyria (889-884 B. C.), this monarch records the receipt of rich tribute at the city of Anat, in the Euphrates, from Ilu-ibni, prefect of the land of Suhi. Besides three talents of silver and twenty minas of gold, the prefect sent him an ivory throne and three other objects made of ivory.‡

Even more ancient than any of the Assyrian ivories in the Louvre or in the British Museum, and rivalling in age the early dynastic objects of Egyptian workmanship, are some carvings found at Bismaya, in the very heart of Mesopotamia, by Dr. Edgar James Banks in the course of his excavations there during the early part of the year 1904. These objects, discovered on or near the site of an ancient palace temple of the Sumerian or pre-Semitic period, may have been executed as far back as 4000 B. C., and belong in any case to the fourth millennium before the commencement of our era. The workmanship is somewhat rude, various animal figures being represented, for example a cat, and fishes, both black and white, over 4 in. in length. Although the

*Layard, "Nineveh and Its Remains," 2d ed., London, 1849, Vol. II, pp. 205 sqq.

†Layard, "The Monuments of Nineveh," London, 1849 (1st Series), p. 20, Pl. 89.

‡V. Scheil, "Annales de Tukulti Ninip, roi d'Assyrie," Paris, 1909, p. 19. Bibliothèque de l'École des Hautes Études, Fasc. 168.

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carver has given these latter a curved shape, as though they were swimming through water, they were pierced from end to end for suspension as charms or amulets. A stag browsing off the foliage of a tree was the best specimen discovered of the ancient Sumerian work.* An example of ivory inlaying was offered by the fragments of a vase on which the artist had depicted a royal procession, in which were musicians bearing seven-stringed harps. Here the skirts of the figures had consisted of ivory inlays, one of which was still in place, the hollowed surfaces indicating where the other similar inlays had been set.†

The sovereigns of Israel from Solomon's time indulged in the luxury of ivory ornaments for their palaces, and to Solomon himself is attributed the possession of a splendid ivory and gold throne with six steps, each step flanked on either side by the figure of a lion, while two lions were placed one at the right and the other at the left of the seat. The work was probably executed by Phoenician artists, and with material brought from Egypt by way of Tyre. About three centuries later than the time of Solomon we find recorded in the annals of Sennacherib, in the year 701 B. C., that Hezekiah, King of Judah, gave "ivory couches and ivory thrones (or seats)" as part of his tribute to the Assyrian.‡ In the sixth century B. C., during the Babylonian Captivity, the prophet Ezekiel writes of horns of ivory (lit. "horns of teeth"?) as articles brought into the great mart of Tyre. In one of the Tel-el-Amarna letters, dating from the four-

*Edgar James Banks, "Bismaya, or the Lost City of Adab," New York and London, 1912, p. 272.

†Op. cit., p. 268; several of these ivories are figured on p. 274, and one on p. 273.

‡Robert William Rogers, "Inscriptions of Sennacherib," in *Records of the Past*, New Series, Vol. VI, pp. 80-101; London, 1892; Column III, Line 36 of inscription known as the Taylor Cylinder, or Prism. See also Bezold, "Die Prisma Inschrift des sog. Taylor Cylinders"; *Keilinschriftliche Bibliothek*, Vol. II, Berlin, 1890, p. 97. The Assyrian name for ivory is *shinni piri* (elephants' teeth), and elephants are mentioned in Shalmanassar II's Nineveh Obelisk as tribute from the land of Musri.



IVORY STATUETTE

ELAMITE ART OF 2000 TO 1500 B. C. FOUND IN THE EXCAVATIONS AT SUSA IN PERSIA, AND REGARDED AS ONE OF THE FINEST ANCIENT IVORY CARVINGS.

I. FRONT VIEW. II. REAR VIEW.

MUSÉE DU LOUVRE, MME. DIEULAFOY ROOMS



CHIEF IVORY CARVING

teenth century B. C. and written in the little-known Mitanni language, there seems to be noted a statue or statues of ivory.*

There was recently brought from the Island of Crete a small ivory statuette, evidently belonging to an early period of the fictile art of the inhabitants of Crete. In form and appearance the figure vividly suggested a faïence statuette unearthed in Crete by Sir Arthur Evans, in 1903, in a small inner room of the ancient temple of Knossos, representing a female figure grasping in one hand the head of a snake and holding its tail in the other, while its coils are wound about her body. This faïence statuette was found with a number of other objects of the same material, votive offerings, etc., the whole having been enclosed in two large stone chests and apparently constituting the outfit of a shrine or altar. Another somewhat similar but smaller figure, holding in each upraised hand a small snake, was also found in the same depository. The larger figure was believed by Sir Arthur Evans to be intended to represent the great Cretan goddess in her earth-born aspect. While in the Cretan ivory we figure the serpents are lacking, the pose and drapery so closely resemble the faïence of Knossos as to strongly suggest that the artist wished to portray the Cretan goddess. It is true that some archæologists consider that the snake-bearing figures merely signified snake charmers whose services may have been used in some of the entertainments offered to the Minoan lords and ladies of olden time; but it seems rather unlikely that such objects should have been carefully conserved in the royal palace.

The prehistoric Greek remains of Attica, Crete, and Cyprus prove that ivory was used at an extremely early period in these regions for ornamental purposes, the supply coming, of

*P. Jensen, "Vorstudien zur Entzifferung des Mitanni," in *Zeitschrift f. Assyrologie*, Vol. V, p. 189; Leipzig, 1890.

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course, from the African continent. Some of the finest specimens have been afforded by the tombs of Sparta in Attica, dating from the Mycenaean period, about 1500 B. C. One of the finest examples found here was a plaque carved with the figures of a bull and a lion. The latter has sprung upon the bull's back, seizing it by the throat, and the position and protruding tongue of the victim show the deadly character of the attack. The bull is much more successfully depicted here than is the lion.* Another ivory carving of exceptional merit from these tombs is a very fine-toothed comb, the first zone offering the representation of two sphinxes, while in the second zone are carved three of these enigmatical figures; each side bears the same decoration.† A curious relic from Phætos in Crete is an unworked piece of ivory from a large elephant tusk.

The remains of the ancient palace at Knossos, in Crete, from the Minoan period, have furnished fragments of some ivory statuettes, one of which has been partly reconstructed. This is the image of an athlete, with every muscle strained for the accomplishment of some arduous feat; the statuette is about 28 cm. long.‡ The work dates from between 1800 and 1550 B. C. The early Greek island art in ivory carving is also illustrated by some objects found at Enkomi, Cyprus. The finest of these is the beautifully carved handle of a mirror, showing a genius and a griffon. There is also from here a carved ivory box with a representation of hunting scenes, a production, probably, of the ninth century B. C. This is now in the British Museum collection.**

Another fine example of carved ivory was brought to light

*René Dussaud, "Les Civilisations Préhelléniques dans le Bassin de la Mer Égée," 2d ed., Paris, 1914, p. 176, Fig. 131.

†Op. cit., Fig. 132.

‡Op. cit., pp. 72, 73; see Fig. 49, p. 70.

**Op. cit., p. 314; see Fig. 222, p. 311, and also Fig. 199.

in the excavations of Knossos, in Crete, during the season of 1902-1903. This was a carving in the shape of a knot with a fringed border, and it evidently possessed a certain symbolic character connected with some of the religious rites or beliefs of the Cretans of about 1500 B. C. As instances of the use of this form elsewhere in ancient Greece there are noted two alabaster knots of similar design from one of the graves at Mycenæ. This ivory knot of Knossos was found near the great gypsum pillar in the centre of a room of the ancient palace, and on a gold ring from Mycenæ is figured a sacred pillar from the entablature of which are suspended two knots of this type; a seal impression from the Palace of Knossos shows similar knots hung upon a tree. This form also appears on a gem from the Heræum at Argos, the examples being figured here on either side of a bull's head.*

On the site of the Spartan temple of Artemis Orthia have been found a considerable number of very interesting specimens of relief carving in ivory.† Many of these are plaques which were riveted on bronze clasps for their adornment. The ivory plates are of rectangular form, and vary in dimensions from 11 x 8.25 cm. ($4\frac{1}{2}$ x $3\frac{1}{4}$ in.) down to 3.5 x 2.75 cm. ($1\frac{1}{3}$ x 1 in.). The greater part belong to the period between 750 B. C. and 650 B. C. The largest and finest of them depicts the slaying of the Gorgon.‡ Although considerably damaged, enough remains to show the design satisfactorily; the execution is very spirited, and this particular work indicates an Oriental influence, possibly indirectly an Assyrian one, and is believed to belong to a somewhat later

*A. J. Evans, "The Palace of Knossos," in the *Annual of the British School of Athens*, No. IX, London, n. d., pp. 1-154; see pp. 7, 8, and Fig. 4 on p. 8, "Sacred Knot of Ivory."

†R. M. Dawkins "The Sanctuary of Artemis Orthia"; "Excavations at Sparta, 1907"; in the *Annual of the British School of Athens*, No. XIII, Session 1906-1907; see pp. 77, sqq.

‡Op. cit., Fig. 19, p. 79.

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period than that of most of the other plaques, perhaps dating from the first half of the sixth century B. C.

In addition to these plaques for the decoration of *fibulae*, several examples of ivory animal carvings have been unearthed here. An especially interesting and artistic work of this kind represents a lioness throttling a calf, and the idea of a chain of destruction, or else of a speedy vengeance for the victim, is illustrated by a third figure in this strange group, that of a man standing alongside the lioness and thrusting a sword into the animal's neck. This ivory is also attributed to the later period of from 600 B. C. to 550 B. C.*

Even more valuable from an historic viewpoint is a relief carving on a large half disk of ivory, the base line of the semicircle measuring 23.5 cm. ($9\frac{1}{4}$ in.), the extreme width being 11 cm. or $4\frac{1}{3}$ in. On this is carved a representation of a warship of the period, not a very formidable one it is true, since the armed crew consists of but three persons, a number of others being engaged in navigating the craft. One of the warriors wears a plumed helmet. The artist has evidently intended to portray the departure of the ship, and the captain seems to be taking leave of a woman, supposedly on land, but given the rather unsteady support of one of the ship's paddles, as the carver lacked space to figure the shore. Behind the woman is a large bird and the prow of the vessel bears the inscription in early Greek characters *φορβάλα*, proving that the carving was a votive offering to the temple of Artemis Orthia. While we have followed Mr. Dawkins' description as to the purely human quality of the female figure, it is not easy to avoid making the conjecture that this was in reality intended to represent the figure of the goddess of the temple. Around the edge of this semicircle of ivory runs a border with a series of circular depressions which Mr.

*Op. cit., Fig. 23, p. 82.

Dawkins suggests may possibly have contained inlays of amber.*

These products of the ivory carvers' art were certainly executed in Sparta, although the material must have come from Africa. This is conclusively demonstrated by the evidence of a specimen in which the design has only been sketched out, in summary incision, prior to being definitely worked up.†

In the Homeric age the Iliad relates that reins and harness of ivory, sometimes stained a red colour, were valued possessions of the heroes, as appears in the following lines:

As when some Carian or Mæonian maid
With crimson dye the ivory stains, designed
To be the check-piece of a warrior's steed:
By many a valiant horseman coveted,
As in a house it lies, a monarch's boast
The horse adorning, and the horseman's pride.

Il. IV, 141 *sqq.*,
Lord Derby's translation.

The Odyssey tells of palaces resplendent with ivory.‡ The tombs of Mycenæ yielded to Schliemann a few ivory objects, the most noteworthy being a thick flat piece which may have served for a dagger handle, decorated with a spiral design.** The elephant itself, however, is not alluded to; indeed, Herodotus writing in the fifth century B. C. is the first writer to employ this name in the Greek form *elephas*, which has been derived by some from the Hebrew (or Phœnician) *eleph*, an ox.

An ivory casket found at Ruvo, Italy, and now in the

*Op. cit., Plate IV; for description see pp. 100 *sqq.*

†Op. cit., p. 78.

‡Odyssey IV, 73.

**Schliemann, "Mycenæ," New York, 1878, p. 329.

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Guilhou Collection, is believed to be Cyprian work of the sixth century B. C. The sides bear archaic figures of women reclining at a banquet, and the casket is surmounted by the figure of a lion. Traces of colouring remain on the mouth and hind legs of the lion and also on the garments of one of the women and on the cushion on which she leans.*

On the site of the famous Phœnician city of Sidon a small ivory casket has been found. On one of the sides is carved the representation of a woman smelling a lotus flower she holds in both hands. This casket is believed to be the work of a Cypriote artist, both because of its similarity in design to other work from that island and because in the sixth century B. C., the date assigned conjecturally to the casket, ivory was very freely used for ornamental purposes in Cyprus. In 1889 Dr. Ohnefalsch-Richter† dug up on this island a number of swords and knives having hilts inlaid with ivory.

The coffer of Kypselus, dedicated by him about 600 B. C., to the Temple of Hera at Elis, was adorned with bas-reliefs in ivory, as were many ancient coffers. Two plaques used in this way have come down to us, showing the holes through which they were pinned to the wooden framework. These were found at Isca Silurum and represent, respectively, a tragic mask and a nymph leading a boy with a basket of fruit.‡

The ancient sepultures of Spain have preserved some most striking specimens of Phœnician ivory carving, of the type produced for exportation to the many lands with which the Phœnicians had commercial relations. These

*Pollak, "Archaisches Elfenbein," *Mitteilungen des Kaiserlich-deutschen Instituts*, Vol. XXI., Roma, 1906, pp. 314-330; Pl. XV.

†Max Ohnefalsch-Richter, "Kypros, the Bible and Homer," Vol. I, Text, London, 1893, p. 140; the side of the earliest is figured in Vol. II, Pl. CXV, Fig. 4.

‡King, "Antique Gems and Rings," London, 1873, p. 296.



ANTIQUE IVORY SPINDLES AND CHARMS
III CENTURY, A. D. FROM SYRIAN TOMBS

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are principally ivory tablets and combs, and although owing to the many centuries that they have been buried, the ivory has split up into sections, or even fragments, the surface is usually well preserved and the engraving as clearly defined as when first executed. Several of these objects may be seen in the collection of the Hispanic Museum, New York City. The combs exhibit a number of designs in which human and animal forms are combined; in others, again, the carver has only depicted animal forms. For example, one tablet shows a bull attacked by two lions; on the reverse appears a gazelle between a lion and a griffin. A comb, from the Celto-Punic necropolis of Cruz del Negro, Carmona, is engraved with a design representing a lion lying down and having a bird between its paws; a gazelle is graven on the reverse side.

More curious and interesting than these purely animal subjects are two tablets, from the tumulus of Bucarrón, representing a combat between warriors and lions. On one of these plaques the valiant combatant is withstanding the attack of two lions, while the other one represents a single combat. The type of the warrior, with his long pointed beard, is curiously suggestive of the so-called "Hittite" art of northern Syria which flourished for many centuries before 1000 B.C., and these or similar types were probably copied and recopied in the commercial art of Phœnicia. From the necropolis of Cruz del Negro came also an Egyptian spatula of ivory, and an ivory comb with an engraving of gazelles and griffins, found May 15, 1908.

A bone-incrusted bed of the second or first century B. C. was found in the necropolis of Orvieto, Province of Perugia, and is now in the Field Museum of Natural History, Chicago. This is an example of the Etruscan funeral bed, a resting couch for a deceased person, and is of table shape. The dimensions are: length, 55 in.; width, 30 in.;

height, 26 in.; the comparative shortness indicating a slight flexion of the dead body. As restored, the inlays on the side are placed as follows: a lion head, a bust, a winged head, a bust, and lastly a lion head; at the corners are figure groups. The rather spindly legs are made up of many pieces, incrustated with bone inlays. Another, but inferior example, is in the Papa Giulio Museo in Orvieto.

In one of his scathing denunciations of the venality and rapacity of the infamous Caius Verres, for a time prætor of Sicily, the great orator Cicero, in 70 B. C., recounts how this shameless Roman functionary wrenched off the rich ivory and gold adornment of the Temple of Minerva in Syracuse. The ivory carvings here were of the very highest artistic excellence and famed for their surpassing beauty throughout the Greek world; one of the most notable offered an awe-inspiring representation of the Gorgon's head with its writhing serpents. All these splendid carvings, and also the massive gold bosses, elaborately chased, adorning the temple doors, works of art in which the workmanship was even more precious than the metal, were ruthlessly stripped off and borne away to Rome by Verres as though the spoils of war. Indeed, as Cicero says, even a conquering enemy with any claim to civilization would not have wrought such wanton havoc, only possible for barbarians.*

The very large size of the pieces of ivory which must have been required by the Greeks in the production of their colossal gold and ivory statues, some of which were forty feet or more in height, the face, hands, and feet being of ivory, and even the large size of some of the consular and other diptychs that have come down to us, have raised the question, how did the ancients secure pieces of ivory of sufficient size? In our day, with the processes now in use, this would not be possible. Hence it has been conjectured that they

*M. Tullii Ciceronis, "In Verrem Lib. IV; De Signis"; Oratio nona, cap. 56.

possessed some lost art for welding together separate pieces of ivory. In the late Latin treatise on the arts of the Romans, belonging probably to the tenth century, and which passes under the name of Eraclius, the following directions are given: "Take sulphate of potash, fossil salt, and vitriol; these are ground with very sharp vinegar in a brass mortar. Into this mixture the ivory is placed for three days and nights. This being done, you will hollow into a piece of wood as you please. The ivory being thus placed in the hollow, you direct it and will bend it to your will." But this recipe as well as others given by various ancient writers do not give satisfactory experimental results.

Although in some instances tusks of quite exceptional size have furnished very large flat pieces of ivory, it is regarded as possible, if not probable, that the ancients cut large cylindrical pieces from the median part of the tusk, split these cylinders at a given point, softened them by some process, and then flattened them out, thus securing a piece as broad as the circumference of the tusk. This theory was advanced by Mons. Quatremère de Quincy. Steeping in vinegar and almond oil does really render ivory ductile to a certain extent. While it can be decomposed by caustic alkalis, it cannot be recomposed.

Some very interesting, even if possibly not quite exact, information as to the care bestowed upon the ivory material of their statues by the ancient Greeks is afforded us by Pausanias. Treating of the colossal chryselephantine statue of Zeus at Olympia, he notes that around the black stone flagging laid in front of the image there ran a raised edge of Parian marble "to keep in the olive oil and water that is poured out," adding, "for oil is good for the image at Olympia," since it counteracted the effect of the moist atmosphere caused by surrounding marsh land. In spite of all precautions, we learn that some of the ivory plates did really crack

and that the aid of the sculptor Damophon was called in to remedy the evil. He succeeded in fitting them together again with the utmost accuracy, for which task he was greatly honoured by the Eleans. The importance accorded to the care of the great Zeus is shown by the fact that the cleaner of this image had a special seat reserved for him in the theatre of Athens.* In the dry air of the Acropolis at Athens, however, not oil but water was used to prevent the material from drying out. On visiting Epidauros and viewing the ivory and gold statue of Asklepios there, the Greek traveller was informed that in this case neither oil nor water was used on the ivory, and when he inquired the reason he was told that directly beneath where the statue rested was a deep excavation—a kind of well—and that the moisture arising from this was just sufficient to preserve the ivory in proper condition.†

It was stated that the injunction to pour oil over this Zeus image emanated from the great Phidias himself, who had enjoined that this should be done “so as to keep it immortal as far as possible.”‡ The use of oil immediately on the ivory has been doubted, and Schubart conjectures that it was rather applied to the wooden framework to prevent this from shrinking and thus cracking the ivory plates covering it.** A confirmation of this view is found in Pliny’s assertion (Nat. Hist. Lib. xvi) that in the statue of Artemis at Ephesus, the “Diana of the Ephesians,” were many holes into which oil was poured to prevent the framework from splitting.

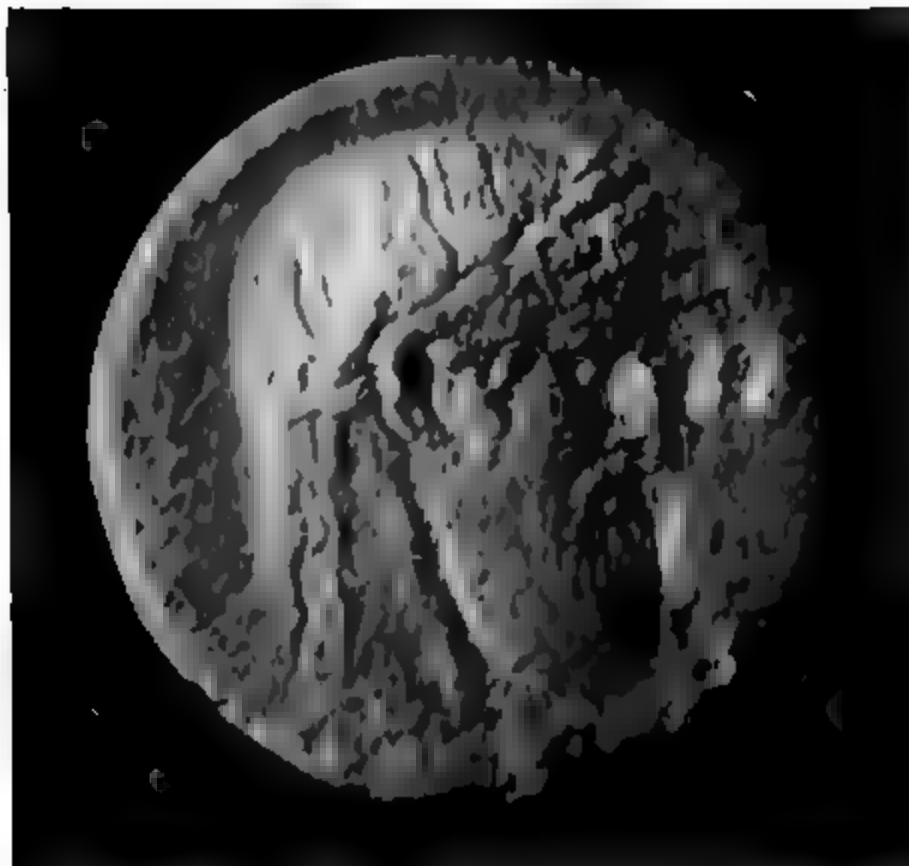
In his “Description of Greece” Pausanias mentions a

*C. I. A. III, Nos. 248, 291; in Fraser’s Pausanias, Vol. 11, p. 182.

†Pausanias, Descriptio Græciæ, Lib. V, cap. 11, 10.

‡Methodius in Photius, Bibliotheca, p. 293, b. 1, sq., ed. Bekker. Cited in Fraser’s Pausanias, London, 1898, Vol. III, p. 545.

**Zeitsch, f. d. Alterthumswissenschaft, Vol. I, 1849, pp. 407-413.



HEAD OF OLYMPIAN ZEUS

AFTER THE CHRYSELEPHANTINE STATUE BY PHIDIAS AT OLYMPIA REVERSE OF A COIN OF HADRIAN (117-138 A. D.).

BIBLIOTHÈQUE NATIONALE



MEDAL OF EMPEROR HADRIAN

STRUCK IN ELIN AND BEARING ON THE REVERSE A REPRESENTATION OF THE GREAT CHRYSELEPHANTINE ZEUS OF OLYMPIA BY PHIDIAS. POSSIBLY STRUCK TO COMMEMORATE THE DEDICATION BY HADRIAN OF A REPLICA OF THIS COLOSSAL STATUE IN ATHENS. 2 DIAM.

IN THE MUSEUM AT FLORENCE, ITALY



CONSULAR DIPTYCHS

BIBLIOTHÈQUE NATIONALE

I. LEAF OF A DIPTYCH OF JUSTINIANUS

CONSUL IN 521 A. D.

FROM AUTUN

II. LEAF OF A DIPTYCH OF MAGNUS

CONSUL IN 518 A. D.

FROM HOLLAND

number of chryselephantine statues, busts, and reliefs, giving in some cases the names of the artists to whom they were attributed in his time. The body or framework of these statues, of which several were of colossal dimensions, was frequently of wood, though sometimes of stone, the ivory being used for the face, hands, and feet, while the hair and garments and the beard, in the case of bearded gods or heroes, were of gold. Sometimes all parts of the body not covered by drapery were formed of ivory plates.

The following are the principal examples of statues in which ivory was employed, noted by Pausanias:

Statue of Zeus at Athens, erected by Emperor Hadrian. A colossal statue, probably a copy of the Phidian Zeus at Olympia (Lib. I, cap. 18, 6).*

The Dionysos Eleutherios of Alkamenes, executed some time between 420 and 413 B. C. (Lib. I, cap. 20, 3).

Athene Parthenos of Phidias in Parthenon of Athens (Lib. I, cap. 24, 5).

The head of the Zeus statue in Megara (Lib. I, cap. 40, 4). By Theokosmos, who is stated to have been aided in the work by Phidias.

Statue of Athene in Megara (Lib. I, cap. 42, 4). Wood, gilded; face and extremities of ivory.

Parts of the Amphitrite, Poseidon, Palæmion, and Tritons, and the hoofs of the horses in the group on the Isthmus of Corinth (Lib. II, cap. 1, 8).

Statue of Dionysius at Akrokorinthus (Lib. II, cap. 7, 5).

Statue of Asklepios by Kalamis in Sikyon (Lib. II, cap. 10, 3).

Statue of Aphrodite by Kanachos in Sikyon (Lib. II, cap. 10, 3).

Statue of Hera, of colossal size, by Polykletus in the Heræum at Argos (Lib. II, cap. 17, 4).

*The coin we have reproduced was probably struck in commemoration of this.

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Statue of Hebe by Naukydes in the Heræum at Argos (Lib. II, 17, 5).

Statue of Asklepios by Thrasymedes in Epidaurus (Lib. II, cap. 27, 2).

Statue of Zeus in Olympia, by Phidias (Lib. IV, cap. 31, 6, Lib. V, cap. 11, 1).

Statue of Nicomedes in Olympia (Lib. V, cap. 12, 7).

Busts in the Heræum at Olympia (Lib. V, cap. 17, 3).

Statue of Eurydice (probably the wife of Amyntas II and mother of Philip II of Macedon) in the Heræum at Olympia.

Reliefs on the casket of Kypselus (Lib. V, cap. 17, 5).

Table in Olympia, by Kolopes (Lib. V, cap. 20, 2).

Statue of Athene in Elis (Lib. VI, cap. 26, 3). Said to be by Kolotes, a pupil of Phidias.

Statue of Athene in Pellene (Lib. VIII, cap. 27, 2). Stated to have been executed by Phidias.

Ancient ivory image of Athene in her temple at Alalkomenæ. Carried off to Rome by Sylla. (Lib. IX, cap. 33, 5.)

Image of Dionysos, with face, feet, and hands of ivory, in the treasury of Selinius in Sicily, at Olympia. This Greek Sicilian city was destroyed by the Carthaginians in 409 B. C. (Lib. VI, cap. 19, 10).

Statue of Endymion, entirely of ivory excepting the drapery, in the Olympian treasury of Metapontum (Lib. VI, cap. 19, 11).

Ancient image of Athene Alea at Tegea, carried off by Augustus with the tusks of the Calydonian Boar, one of which was half a fathom long. This image, entirely of ivory, was the work of Endœus (last half of sixth century B. C.) and was set up in Rome on the way to the Forum of Augustus (Lib. VIII, cap. 46, 1, 5).

Of the two ancient reproductions in marble of the great Athene Parthenos of Phidias which have been discovered in Greece, that found in 1880 is the more satisfactory, although

the rude workmanship shows that we have here rather a summary indication than a faithful copy of the great and colossal original. The outstretched hand of the goddess, upon which rests a statue of Nike, has an external support in the form of a slender column, and some critics are unwilling to believe that the Phidian statue was so designed. However, when we consider the height of the original Nike figure, about six feet, we must realize that its unsupported weight would have brought a tremendous strain to bear upon the framework of the outstretched forearm, a strain quite great enough to warrant the artist in seeking to provide for it by some such means as that shown in the reproduction.

It is related that Tarquin had a sceptre and a throne of ivory, and that after his downfall these were given up by the Roman Senate to the Etruscan, Lars Porsenna, on the conclusion of peace between him and the Roman Republic. It was also with an ivory staff that Marcus Papirius smote the Gaul who had dared to touch his beard to see whether he was man or statue, when the grave and reverend senators sat so immovably in their seats that the victorious Gauls who broke into the Senate chamber were uncertain whether they were living men or only images.*

Among the gifts bestowed by the Roman Senate upon the tributary or semi-tributary sovereigns were the ivory curule chair and the ivory sceptre. The Latin historians make frequent mention of this, noting the ivory sceptre given to Eumenes, King of Asia.† One was also sent to Ptolemy, of Mauritania, according to Tacitus. An ivory staff was a well-recognized Roman emblem of honour in the case of consuls and those celebrating a triumph.‡ It was in many cases surmounted by the image of an eagle; under the em-

*Jules Labarte, "Histoire des arts industriels," Vol. I, Paris, 1864, p. 189.

†Titus Livius "Ab urbe condita," XLII, 14.

‡Juvenal, Sat. X, 43.

perors a bust had taken the place of the eagle, in most cases that of the reigning emperor himself.* The origin of the use of these and similar objects has been traced back to Etruscan royalty. The Tyrrhenian cities, as a sign of submission, sent to Tarquin with other gifts an ivory seat, and one was given by the Roman Senate to Porsenna as a special mark of favour.†

A strikingly beautiful and artistic specimen of ancient Roman ivory carving was unearthed in the neighbourhood of Vienne (Dept. Isère), France, the site of an old Roman settlement in the Gallic province. It is a finely executed female head, showing all the calm dignity and the purity of outline characteristic of the very best classic sculpture. This valuable carving is now in the Musée de Vienne.‡

There are evidences that ivory was both known and appreciated by the Celts at a very early period, although, because of its relative destructability as compared with amber or glass, but few specimens are now extant. However, both in France and Germany the tumuli of the Hallstat Period, extending down to 500 B. C. and even later, have furnished a few specimens, such as rings and the handles of different toilette articles. Such examples have been unearthed from the tumuli of Aprimont (Dept. Haute Saône) and from those of Buchheim in Baden. In this connection may also be noted the use of human teeth as part of the adornments of necklaces and of other objects.**

The most wonderful works of art in which ivory was ever used were unquestionably the colossal chryselephantine, or

*H. K. E. Kohler, "Serapis," St. Petersburg, 1850, Pt. I, p. 198.

†Dion. Halicar., V, 35.

‡"L'art à l'Exposition Universel de 1900" (Exposition Rétrospective), Paris, December, 1900, p. 12, Fig. 1.

**Joseph Déchelette, "Manuel d'Archéologie Préhistorique Celtique et Gallo-Romaine," Paris, 1913, Pt. II, pp. 831, 875; see Figs. 367, p. 874, handle ornaments No. 1 from Buchheim, Nos. 2, 3, from Apremont.



I. WING OF A TRIPTYCH DEPICTING ST. THEODORUS

BYZANTINE ART OF X OR XI CENTURY

MUSÉE DU LOUVRE



II. CONSULAR DIPTYCH

LEAF OF A DIPTYCH OF FELIX, CONSUL IN 428 A. D. FROM LIMOGES

BIBLIOTHÈQUE NATIONALE



I. LEAF OF A CONSULAR DIPTYCH

ROMAN ART OF THE V OR VI CENTURY

MUSÉE DE CLUNY, PARIS



II. IVORY PLAQUE DEPICTING ST. PAUL

LATIN ART OF THE VI CENTURY

MUSÉE DE CLUNY, PARIS

gold and ivory statues of Zeus at Olympia and of Athena Parthenos in the Parthenon at Athens, both executed by the immortal Phidias in the fifth century B. C. The Athena was about 40 feet high, the face, hands, and feet being of ivory, as well as the Medusa's head at her side. On her hand she bore an ivory Nike, or Victory, over 6 feet in height. These and other similar though less stupendous works, such as the statue of Hera at Argos, the work of Polykletus and that of Asklepios at Epidaurus, made by Thrasymedes, all prove that ivory was regarded by the Greeks as of the very highest value and importance in art.

In Rome also the beautiful artistic effects to be attained by using this material made it a favourite one with art workers. While the immense statues of the Greek gods have passed away leaving no trace behind, we have from Roman times a number of precious relics of a characteristic use of ivory. These are the consular diptychs and those of certain distinguished private citizens, made of two panels of ivory, hinged on one of their sides so that they could be folded together; these diptychs were at once memorials of events and art works of great beauty. At a much later period, in Christian times, three panels were hinged together forming a triptych, and sometimes there was a central panel having two or more others attached at either side, so that when set upright, with the side panels bent inward at different angles, a small enclosed space was formed wherein might be placed a precious relic or a statuette of a saint.

Of the Roman consular diptychs very nearly fifty have been preserved for us, in whole or in part, and these date from the middle of the third century to the middle of the sixth century A. D.; probably some of those of which we have no specimens belonged to the first or second century. One of the earliest now extant, that of Rufius Probianus, now in Berlin, constitutes the covers of a manuscript relating

the life of St. Ludgerus.* But these official panels are far surpassed in beauty by some executed for private persons.

In the leaf of the diptych of Flavius Felix, consul in 428 A. D., preserved in the collection of the Bibliothèque Nationale in Paris, the consul is shown wearing a richly embroidered tunic, the undergarment, *subarmalia profundis*, being entirely plain; on his feet are the gilt, patrician shoes, the *calcei aurati*. In his left hand he holds a sceptre and a globe, added distinguishing marks being the busts of the two reigning emperors Valentinian III and Theodorus II. The other leaf of this diptych was lost or stolen during the French Revolution; that of the Bibliothèque Nationale came from the Abbey of St. Junieu, at Limoges, France.

The consular diptych of Flavius Anastasius Paulus Probus Pompeius, to give him his full complement of names, is also in the Bibliothèque Nationale in Paris, and is regarded as the finest of those owned by this institution; the Berlin Museum and the South Kensington Museum each have a replica of one of the leaves. This fine example of Roman carving was donated by Charles the Bald to the Abbey of St. Cornille at some time during the ninth century.

The J. P. Morgan Collection, long shown in the Metropolitan Museum of Art, New York, contains among its ivory carvings the two leaves of a Roman consular diptych of the sixth century. This bears the name of Flavius Petrus Sabbatius Justinianus, and was probably produced in 516, or possibly in 521 A. D. On one of the leaves is the somewhat pretentious Latin inscription: *Munera parva quidem pretio sed honoribus alma*, "a gift slight in value but conferring high honour"; on the other leaf is a dedication to the Senators. This diptych was at one time in the Trivulzi Collection in Milan.

*Maskell, "Ivories Ancient and Medieval," pp. 28, 29, South Kensington Museum Art Handbooks No. 2.



CONSULAR DIPTYCH OF ANASTASIUS

CONSUL IN 517 A. D.

FROM BOURGES, NOW IN THE BIBLIOTHÈQUE NATIONALE



CONSULAR DIPTYCH OF PHILOXENUS

CONSUL IN 525 A. D. THE TWO UPPER MEDALLIONS SHOW PORTRAITS OF THE CONSUL, THE TWO LOWER ONES FEMALE BUSTS, POSSIBLY OF THE CONSUL'S WIFE.

FROM ST. CORNEILLE DE COMPIÈGNE, NOW IN THE BIBLIOTHÈQUE NATIONALE

Out of the consular diptychs still extant, thirty-seven bear inscriptions giving the name of the consul, only twelve being anonymous. Whether because this particular consul caused an unusually large number of his diptychs to be made, or simply owing to chance, out of the small total that have been preserved no less than eight are of Areobundus, and the difference in artistic quality between the best of these and the least excellent indicates that more care was bestowed upon those destined as gifts to people of especial prominence than upon those to be bestowed upon less notable persons. The greater part of these consular diptychs were executed in the Eastern Empire.

The diptych of Anastasius, A. D. 517, has on either leaf a seated figure of the consul; above each of these figures are three portrait medallions, the subjects of which are uncertain, and two winged figures with garlands. Below, the left leaf shows two Amazons, each leading a horse by the bridle, probably in preparation for a horse race; beneath this is represented the manumission of some slaves, one of these, a hunchback, being freed by the consul's wife, Anastasia. The corresponding part of the right leaf contains a representation of a combat in the arena between men and wild beasts. This is one of the most effective of the consular diptychs, although in artistic merit it may be surpassed by a few others.

The consular and other diptychs from Roman times had a very practical use as writing tablets, the surface being covered with a coating of wax upon which the writing was made with a metal stylus. They were thus not only valuable and beautiful, but most useful presents. The medieval diptychs and triptychs, on the other hand, had a purely religious significance, and were generally so arranged as to constitute small shrines or tabernacles.

The Roman diptych bearing inscribed on one leaf the name

Nicomachorum and on the other Symmachorum is generally conceded to be the finest work of its kind that has come down to us from ancient times. In the lapse of centuries it has passed through some strange vicissitudes. A plausible conjecture sees in it a work executed toward the end of the fourth century A. D., to celebrate an alliance or compact, social or religious, between two patrician families, the Nicomachi and the Symmachi. This latter family was of consular rank, Quintus Aurelius Symmachus, an author of repute, having been chosen consul in 391 A. D.; his father, L. Aurelius Symmachus, held the rank of prætor about the middle of the fourth century. The design certainly seems to indicate a connection with some religious ceremonial, as on each leaf is figured a Bacchante standing before an altar and about to offer a sacrifice of incense. In view of this we must feel it as an irony of fate that less than three centuries after its production the leaves of the diptych were made to serve as doors to a shrine within which were gathered some of the most precious Christian relics. This shrine was brought from Rome by St. Berchaire about 679 A. D. to the newly founded abbey church of Montier-en-Der, in the diocese of Troyes, France, and the shrine with its ivory doors is described in detail in the inventory of the monastic treasures made in 1717. How long after this time it remained intact appears uncertain; it is said to have been destroyed by fire, although the saintly relics were preserved. Nothing further is known of the ivory doors, the leaves of the Roman diptych, until 1860, when one of them was fished up out of the depths of a well at Montier-en-Der. This leaf, inscribed Nicomachorum, has since been acquired by the Musée de Cluny, Paris. On investigation it turned out that the companion leaf, bearing the inscription Symmachorum, was in the possession of a collector of the city of Montier-en-Der, and from him indirectly it reached the Victoria and Albert



ROMAN DIPTYCH

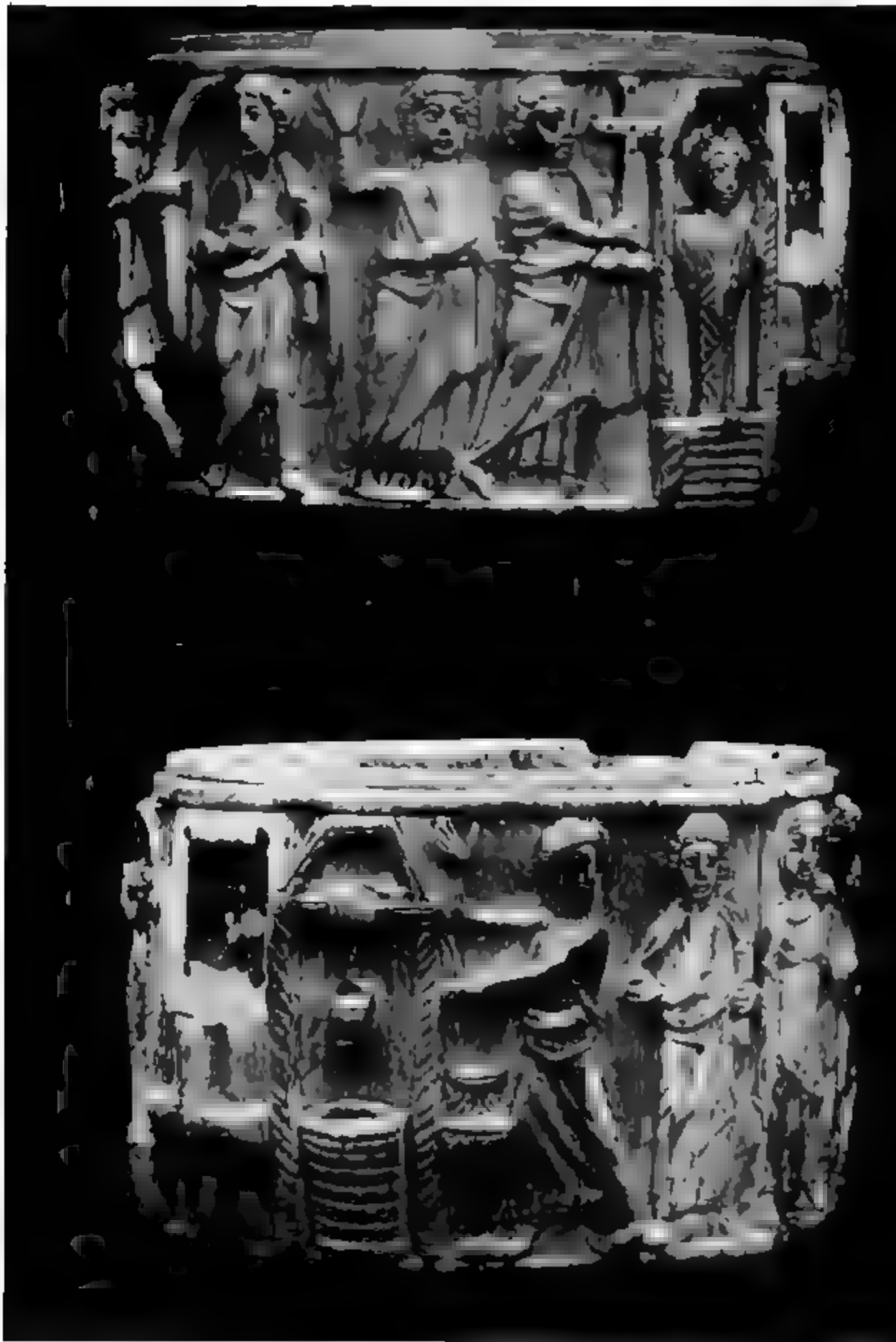
PROBABLY MADE AS A MEMENTO OF THE MARRIAGE OF NICOMACHUS FLAVIANUS, SON OF VIRIUS NICOMACHUS FLAVIANUS TO THE DAUGHTER OF QUINTUS AURELIUS SYMMACHUS (CONSUL IN 394 A. D.) THIS MARRIAGE MAY HAVE TAKEN PLACE BETWEEN THE YEARS 392 AND 394.

THE FIRST LEAF SHOWS A STANDING FEMALE FIGURE, TURNED TO THE LEFT, BEFORE AN ALTAR SET UP BENEATH AN OAK TREE AND SPRINKLING INCENSE UPON A SACRIFICIAL FIRE. ABOVE, THE INSCRIPTION "SYMMACHORUM."

IN THE SOUTH KENSINGTON MUSEUM. FROM A PHOTOGRAPH

ON THE SECOND LEAF IS DEPICTED A WOMAN STANDING, AND HOLDING TWO REVERSED TORCHES, BEFORE A LIGHTED ALTAR SHELTERED BY A PINE TREE. ABOVE ARE THE LETTERS NICOMACHO[RU]M.

IN THE MUSÉE DE CLUNY, PARIS. FROM "LES IVOIRES" BY ÉMILE MOLINIER, PARIS, 1896



PYX FOR CONTAINING THE HOST

LATIN ART OF V OR VI CENTURY. BOTH SIDES

$\frac{3}{4}$ DIAM.

MUSÉE DE CLUNY,

Museum, London, where it now reposes. It seems unfortunate that the two leaves of this most interesting and valuable memento of the past cannot be reunited.

These beautiful diptych leaves, while probably executed in Rome at the end of the fourth century A. D., have been apparently inspired by Greek sculpture of the fourth century B. C., perhaps that of some Greek stele set up in Rome, and which could be there seen and studied by the carver of the diptych.*

Among the treasures of the Kunsthistorische Sammlungen in Vienna may be seen a diptych of the fifth century, on either leaf of which appear allegorical figures denoting respectively Rome and Constantinople, the Western and the Eastern Empires. The genius of Rome is helmeted like a Minerva and holds in one hand a sphere surmounted by a Victory; for Constantinople the artist has chosen a figure of Fortune (Tyche), on her head is a mural crown and in her hands she bears palm branch and cornucopia; to her shoulder clings the child Eros.†

In the very earliest Christian age there were ivory diptychs inscribed with the names of those who had been baptized, thus constituting a partial parish register; upon others again were carved the names of the bishops of the churches and of great benefactors. Still others bore the names of the saints and martyrs, and, finally, there was a fourth class devoted exclusively to the registration of the dead who had passed away after due reception of the last sacraments. Of ivory is one of the most precious relics of the church in the sixth century—namely, the throne of Maximian, Archbishop of Ravenna (546–556). This *cathedra* is high-backed and adorned with a series of ivory plaques carved in relief with

*O. M. Dalton, "Byzantine Art and Archæology," Oxford, 1911, pp. 190, 191.

†"Uebersicht der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses," Wien, 1899, p. 118 (Hall XIV, Case XXI).

scenes from the Old and New Testaments, such as the history of Joseph, the Annunciation, the Adoration of the Magi, etc.; in addition, many figures of saints and also highly ornamental borders combine to render this a most impressive artistic production. The similarity in design and workmanship of this early monument of Christian art to the ivory work executed about this time in Alexandria renders it probable that this seat or throne was executed in Egypt and brought thence to Ravenna.*

On a leaf of a Roman diptych, preserved in the British Museum, is carved a most striking and impressive figure of an angel. This work, executed in the fourth or fifth century of our era, represents the combination of classic and Christian art at its very best and is almost unique in excellence in this respect, for while the religious fervour of a later time may not have abated, the artistic ability of the carvers soon showed a sad falling off, which continued until the revival in the Renaissance art of the French and Italian schools of the thirteenth, fourteenth, and fifteenth centuries. This angel, clothed in classic garb of the most graceful style, has the port and bearing of a prince of the angelic hosts, blending classic dignity and religious majesty in an incomparable way. The technical execution is fully on a par with the artistic conception, and no work of Roman art can be pronounced superior to this.

That the episcopal chair of Ravenna was not a production of the Alexandrian School, but came from the great Syrian art centre, Antioch, is the contention of the distinguished art critic, Mr. O. M. Dalton. The superior quality of workmanship displayed in some of the panels as compared with others has induced the belief that more than one artist was

*See Hans Graeven, "Fragment eines frühchristlichen Bischofsstuhls im Provinzial Museum zu Trier," *Jahrbücher des Vereins von Altertumsfreunden im Rheinlande*, Heft 105, Bonn, 1900, pp. 147-163.

employed in the decoration of this remarkable ecclesiastical work, although Mr. Dalton suggests that a single artist might have taken more pains with the more conspicuous panels and have treated the others with less care. The splendid carving of the archangel, probably St. Michael, in the British Museum, has also been referred to Antioch, where the best traditions of Greek art long held sway.*

In this latter work Strzygowski has seen an influence of the histrionic frescos of Pompeii, in which the short flight of steps by which the actors descended to the stage are flanked by pairs of columns. As such an influence could scarcely be exerted, upon Christian art especially, in any place other than a great centre of population, the conjecture that Antioch was the city where the remarkable carving of the archangel was produced receives additional confirmation.†

A very interesting carved ivory panel in the Bargello in Florence, representing the figure of an empress, has been variously dated by different authorities, Molinier referring it to the Empress Irene, regent for her son Constantine VI in 780 A. D., but the work was probably executed at an earlier period, and may figure Ariadne, who was successively married to the Emperors Zeno and Anastasius I, her son by the latter emperor having died in 507 A. D., to which date, approximately, the panel may be attributed. The curious headgear of the empress was used at a later time in representations of the Virgin Mary.‡

Of the ivory-adorned book covers in the Bibliothèque Nationale, one of the finest and most interesting is formed from a Roman diptych. On one leaf is carved a repre-

*O. M. Dalton, "Byzantine Art and Archæology," Oxford, 1911, pp. 203-206; see Fig. 122, 123.

†Op. cit., pp. 201, 202.

‡O. M. Dalton, "Byzantine Art and Archæology," Oxford, 1911, pp. 213, 214; see Fig. 128.

sentation of Bacchus seated in a car drawn by Centaurs; the other leaf depicts Diana in a chariot drawn by two bulls. The manuscript enclosed by these covers is an example of the so-called "Office of Fools," a semi-travesty of a religious service, tolerated by the Catholic Church on the Feast of the Circumcision, which falls on New Year's Day. Doubtless the pagan designs were expressly chosen as covers for this popular ritual, one of the concessions made by the Church, perhaps not unwisely, to the fondness of the common people for a frolic on the first day of a new year, although such an observance would be regarded to-day, when the religious and secular aspects of life are so sharply distinguished, as a profanation of holy things.

The great Christian church of Santa Sophia, turned into a Mohammedan mosque since the fall of Constantinople in 1453, was enriched with six ivory doors especially commanded for its embellishment by its founder, Emperor Justinian. An old record says that the ivory was elaborately sculptured and the effect enhanced by gold ornaments.* As there can be no doubt that the ivory panels adorned with figured representations of religious subjects were quickly removed and almost certainly destroyed by the Mohammedan conquerors, there is little reason for surprise that no trace of them remains. Perhaps the present year is destined to be noted in future history as that in which this wonderful historic monument, the peerless Santa Sophia, shall have been restored to Christian worship.

There is evidence that work in ivory was extensively done in the early Christian centuries, for among other artists or artisans granted especial exemption by law from certain municipal obligations are noted "the ivory workers (*eborarii*) who make seats, beds, etc., of ivory."

*See Ridulfus de Diceto, in Stubbs's "*Rerum Britannicarum scriptores*," Vol. 71, Pt. 1, p. 98.



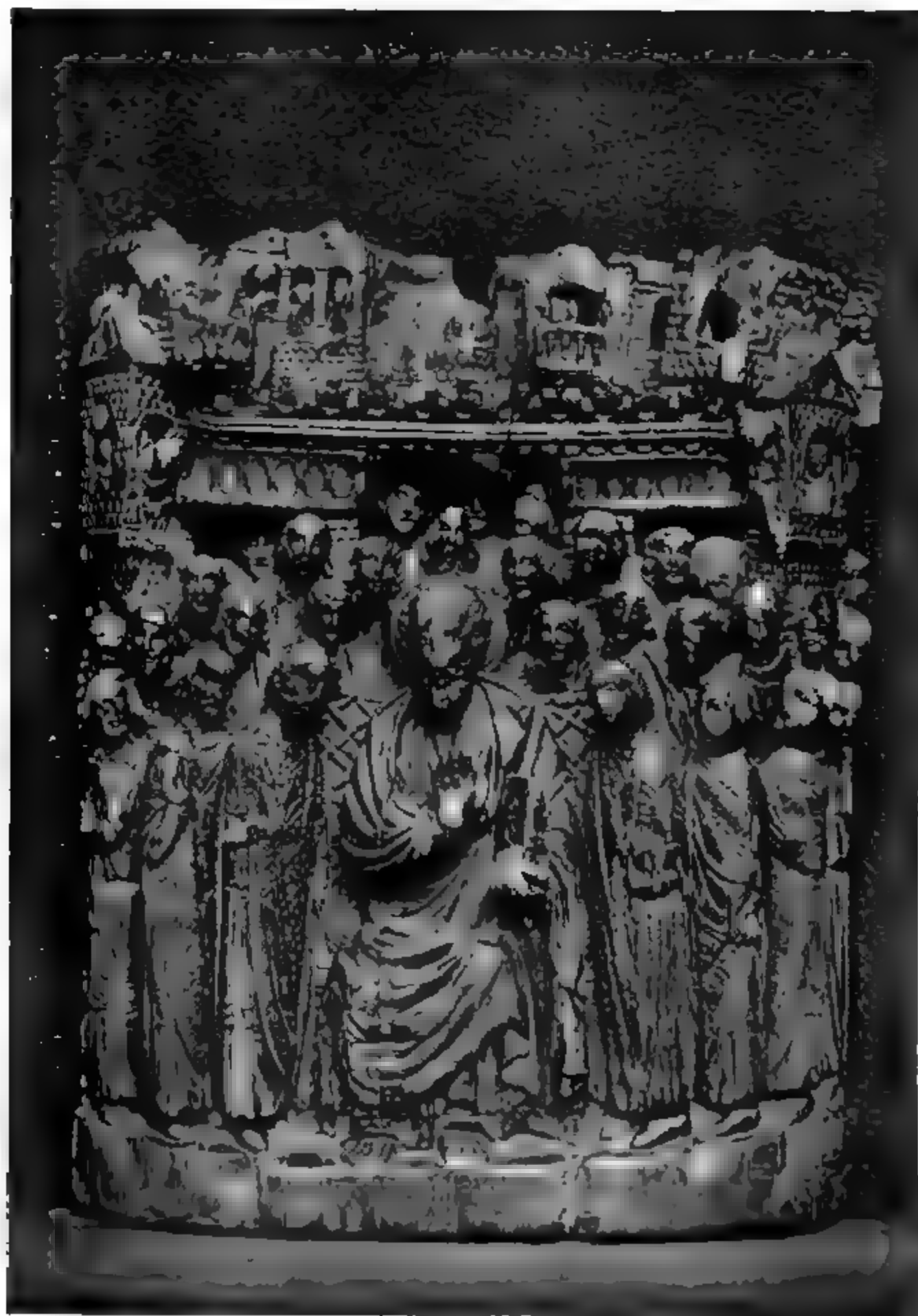
IVORY CASKET

WITH CLAMPS AND HINGES IN GILT METAL, THE SIDES AND LID CARVED WITH SUBJECTS FROM THE PASSION OF OUR SAVIOUR. CAROLINGIAN, X CENTURY.

PYXIS OF CARVED IVORY

BYZANTINE, X OR XI CENTURY

J. PIERPONT MORGAN COLLECTION



ST. PAUL PREACHING
AN ITALIAN IVORY OF THE VI OR VII CENTURY

MUSÉE DU LOUVRE

They shared these privileges with architects and painters, so that their profession must have been regarded as a very honourable one.*

A pyx for containing the sacred Host, executed in the fifth or sixth century by a Latin carver, is one of the most curious ivories of the Cluny collection. The figures sculptured around the sides are copied from the representations on early Christian sarcophagi and depict the cure of the paralytic, that of the man born blind, the Samaritan woman, and the resurrection of Lazarus. In this we have a good example of the decadence of classic art in carving.

Italian art of the sixth or seventh century, representing the rapidly waning classic tradition, furnishes an interesting if not especially beautiful ivory carving in the Louvre Museum. The subject is St. Paul preaching, but the necessities of the treatment have forced the artist to make the apostolic preacher turn his back upon the congregation, unless we are to suppose that those in view represent but a small part of his auditors.

*See Guido Pancirollus, "De magistratibus municipalibus; de corporibus artificum"; in Graevius, "Thesaurus Romanarum antiquitatum," Vol. III, Venetiis, 1732, col. 83.

CHAPTER II

MEDIEVAL AND MODERN IVORY CARVINGS

THE ideals that animated classic art gradually lost their vigour in the course of the early Christian centuries, giving place to new artistic aspirations animated by purely Christian ideals. Some of the works noted in the preceding chapter were already produced under these influences, which so dominated medieval plastic art that only in comparatively few instances did the artist—painter, sculptor, or carver—seek his inspiration elsewhere.

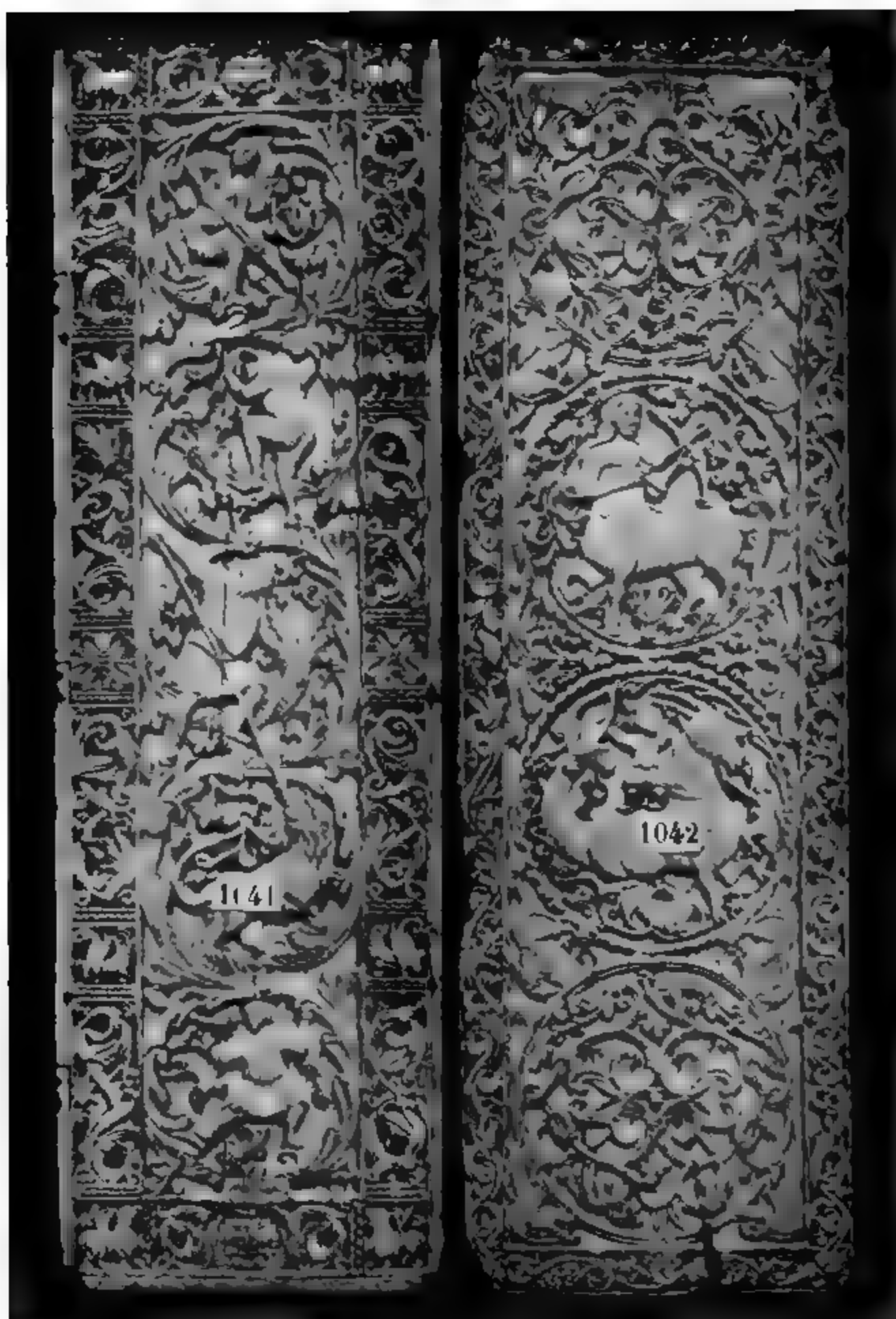
The leading schools of Carolingian ivory carving were those of Rheims and Metz, the former having the priority, while the latter was never so much localized, indeed, it may be regarded rather as a type of the art owing its origin to the influence of the Rheims carvers than as a separate and defined school. One of the best specimens of the early work done at Rheims is in the Staatsbibliothek in Munich. This is a book cover and depicts the Crucifixion. It is characterized by the very lively gestures of the figures, and by the fluttering garments, this vivacity being a quality of the school of Rheims. More sobriety and seriousness is shown in the carvings grouped under the designation of the Metz School, of which an excellent example is in the Bibliothèque Nationale in Paris. This carving, from the time of Ludwiger Fromme, is also the cover of an evangelium. It is divided into three fields, the upper one offering a representa-



IVORY PLAQUE

CARVED IN HIGH RELIEF, REPRESENTING THE CRUCIFIXION, A GROUP OF ANGELS, AND SYMBOLICAL FIGURES OF SUN AND MOON. BELOW ARE FIGURED THE DEAD RISING FROM THEIR GRAVES AT THE DEATH OF CHRIST. CARLOVINGIAN ART OF THE X CENTURY.

BRITISH MUSEUM



IVORY PLAQUES

FIGURING FOUR OF THE ZODIACAL SIGNS: AQUARIUS AND LEO, CAPRICORNUS AND SAGITTARIUS. BYZANTINE ART OF THE IX CENTURY.
1/2 DIAM.

MUSÉE DE CLUNY, PARIS

of the betrayal of Christ by Judas in the Garden of Gethsemane, the middle field, the denial of Peter, while the lower field depicts the Crucifixion. Here the bodies of the crucified thieves are entirely undraped, a unique treatment in these representations; moreover, they are nailed to natural trees, the cross-pieces being the limbs of the trees.*

Of the so-called Metz School of Carolingian carving a characteristic specimen may be seen in the Kaiser Frederick Museum in Berlin. This is a diptych, each leaf measuring 11.3 centimeters ($4\frac{1}{2}$ in.) in height, and having a width of 8.2 centimeters ($3\frac{1}{4}$ in.). There are on each leaf six designs without dividing lines, comprising the Annunciation, the Vision of the Shepherds, the Nativity, the Adoration of the Magi, Christ in the Temple, the Baptism of Christ, the Entry into Jerusalem, the Washing of Feet, Christ in the Prætorium, the Crucifixion, the Women at the Tomb, the Ascension. In the crucifixion scene are shown, at the left of the cross, Mary and Longinus, at the right, Stephanon and St. John, above the cross are weeping personifications of the sun and the moon.† It has been noted that in the work of this type the Christ figure is often disproportionately large as compared with the accompanying figures.

During the reign of the orthodox emperor Michael Rhangabe (811–813 A. D.), when the iconoclastic movement in the Eastern Empire was temporarily checked, Charlemagne sent Halitcharius, Bishop of Cambrai, as envoy to Constantinople, and on his return thence the bishop brought back with him, among the gifts from the Greek emperor, sculptured ivory tablets. These were used to form ornamental covers for liturgical works. A few years later, in 845 A. D.,

*Wilhelm Lange, "Die Darstellungen der Kreuzigung Christi in der niederrheinischen Elfenbeinschnitzerei des XI und XII Jahrhunderts." Thesis. Erlangen, 1912, pp. 20 sqq, Bib. Nat. Codex latinus 9388.

†Ibid, pp. 31 sqq.

40 I V O R Y A N D T H E E L E P H A N T

Hincmar, Bishop of Rheims, had the works of St. Jerome enclosed in covers adorned with ivory tablets in a gold setting, and he also had a lectionary provided with covers of ivory set in silver.*

Two ivory plaques in the Musée de Cluny are specimens of the Byzantine art of the ninth century and are especially noteworthy in that in each case while one side bears a distinctly religious decoration, the other side offers secular designs, including figured symbols of four of the zodiacal signs (two on each plaque) Capricornus, Sagittarius, Aquarius, and Leo. Rich foliage work and scrollwork combine to make a very harmonious design, indicating the possession of both taste and skill by the artist.

The hieratic art of the ninth century is well illustrated in a representation of the Crucifixion on the cover of an evangelium in the Musée de Cluny, uncompromisingly rigid in composition; the absolute symmetry of the grouping is as far removed as possible from the ease and grace characterizing the best works of an earlier and a later period, and yet we may not deny the genuine religious spirit in which the medieval artist has wrought.

But few ivory statuettes were made by the carvers of the Eastern Empire, this being due in great part to the general influence of iconoclastic ideas in the Empire, even when these were not drastically enforced as was from time to time the case. Intense as was the opposition between Christian and Moslem in the East, it appears likely that the Christian image-breakers drew their inspiration from the rigid ideas regarding images and the reverencing of images that were so strongly held by the Mohammedans. In a not dissimilar way, the Protestant image-breakers of the

*Jules Labarte, "Histoire des arts industriels au Moyen Age et à l'époque de la Renaissance," Vol. I, Paris, 1864, p. 213: Citing *Anonymi Gesta episcop. Cameracensium*, lib. 1, 42, apud. Pertz, "Mon. Germaniae hist.," Vol. IX, p. 416, and Flodoardi, "Eccl. Remensis hist.," lib. III, cap. 5, Paris, 1611, pp. 159, 160.



IVORY PANEL

ADORNING THE COVER OF AN EVANGELIUM. IT HAS A RICHLY ORNAMENTED BORDER AND IS PROBABLY A WORK OF THE IX CENTURY.

MUSÉE DE CLUNY, PARIS

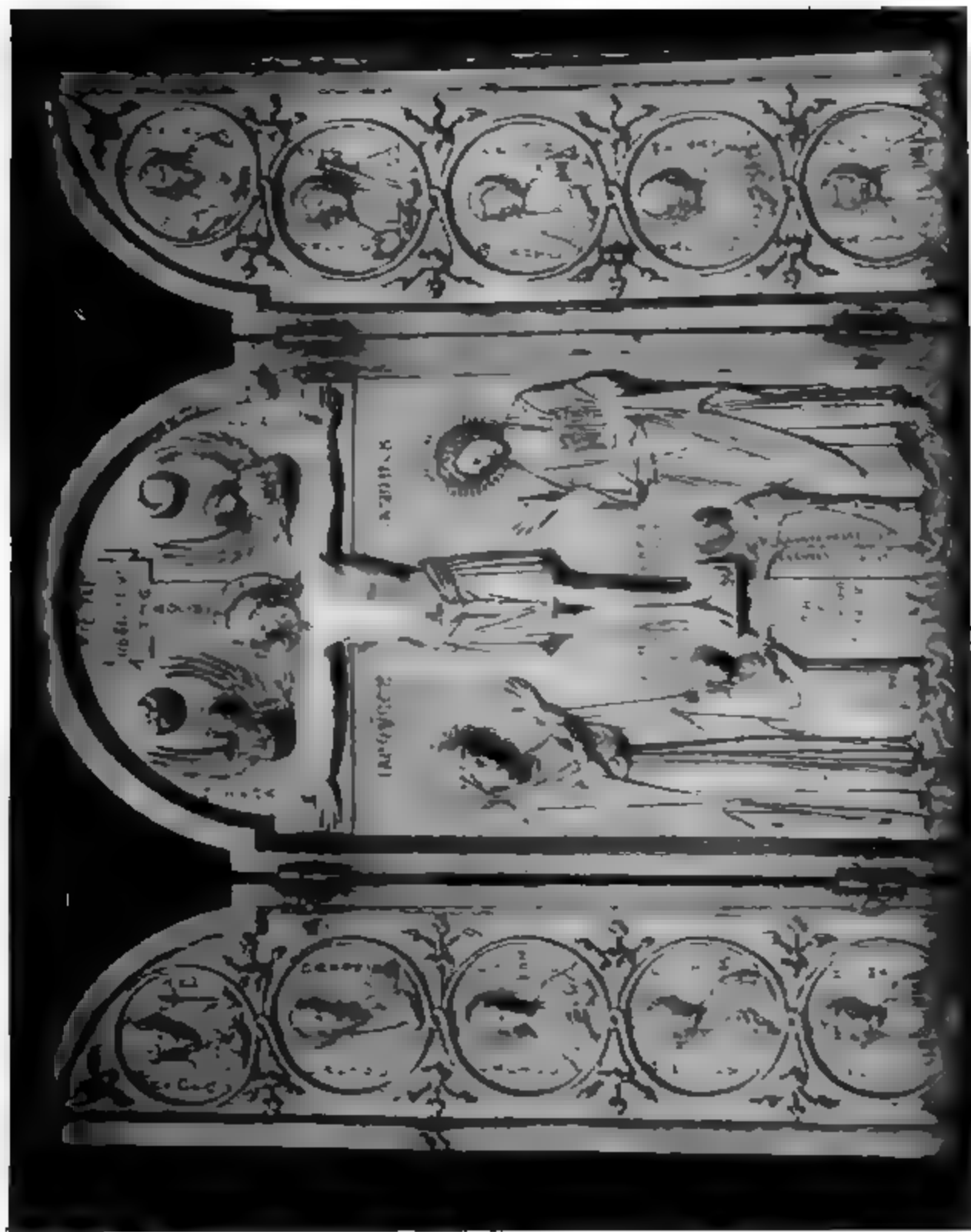


CORONATION OF ROMANUS IV AND OF EUDOXIA

**EMPEROR AND EMPRESS OF THE EASTERN EMPIRE, 1068 A. D. BOOK COVER OF A COPY OF
THE WORKS OF ST. JEAN DE BEBANÇON.**

3/4 DIAM.

BIBLIOTHÈQUE NATIONALE

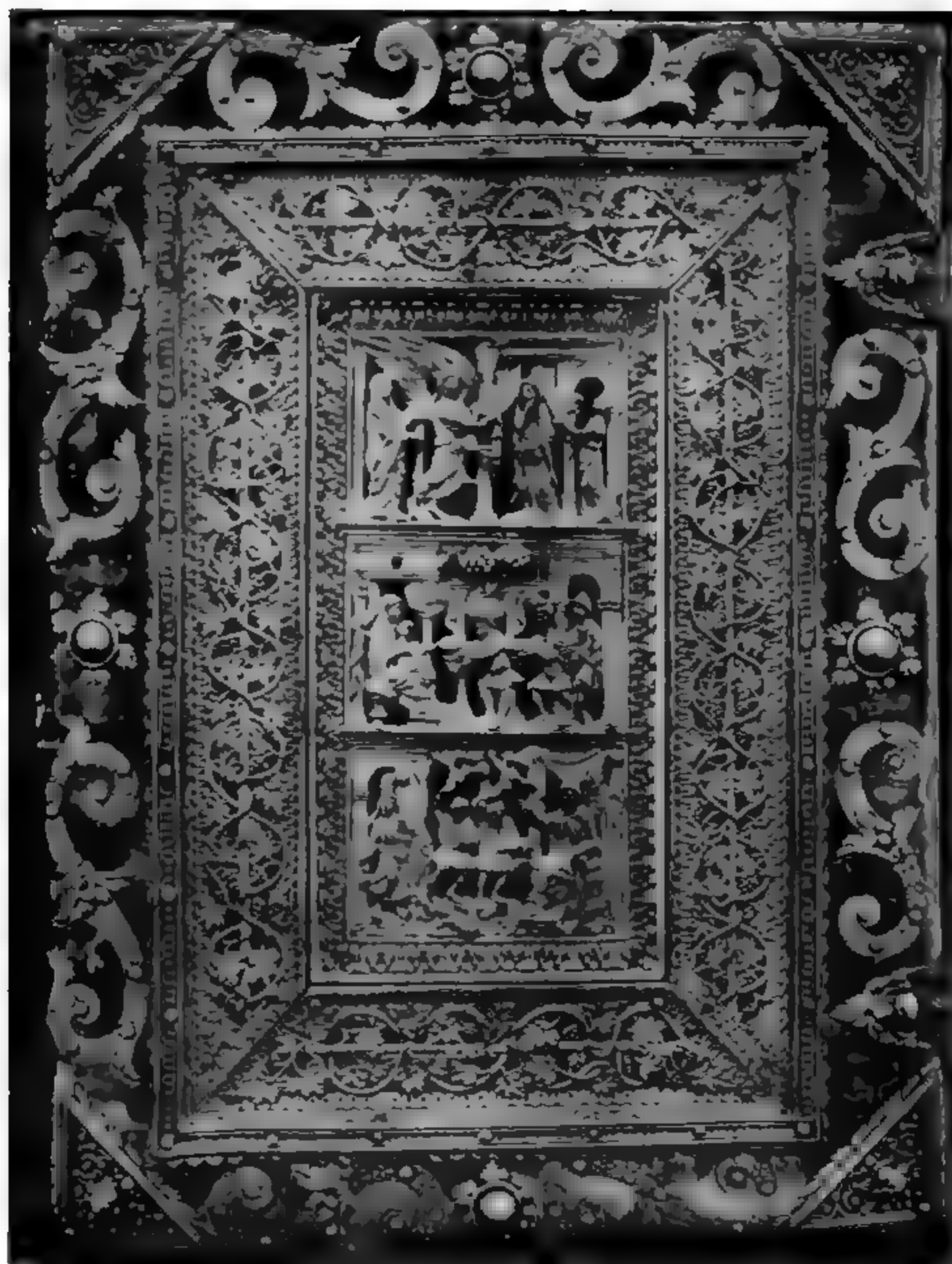


TRIPTYCH

BYZANTINE ART OF THE XII CENTURY

$\frac{1}{2}$ DIAM.

BIBLIOTHÈQUE NATIONALE



BOOK-COVER OF AN EVANGELIUM

CARLOVINGIAN ART. SCENES FROM THE NEW TESTAMENT: ANNUNCIATION, ADORATION OF THE MAGI, MASSACRE OF THE INNOCENTS. ORIGINALLY IN THE CATHEDRAL OF METZ.

BIBLIOTHÈQUE NATIONALE

sixteenth century were fired with their unartistic zeal through fervent study of the Old Testament writers, and we must remember that all the leading principles of Mohammed's religious teaching were directly based upon his second-hand knowledge of the Hebrew Scriptures.

A rhetor named Cyprus is credited with having produced an ivory statuette (or possibly a chryselephantine statue) of Empress Helena, the pious mother of Constantine the Great, and to have donated his work to a church; but this is a rare instance, the almost total absence of ivory statuettes in the medieval East being in marked contrast with their abundance in the West, especially among the ivory carvings of the glorious French Renaissance period.*

The famous Abbot Suger of St. Denis states that in his time (1122-1152) there was in the abbey church a reading-desk enriched with ivory reliefs of such striking artistic quality that the like could not be produced in his age. That these belonged to the Carolingian Age is the opinion of M. Labarte, as Charlemagne completed the reconstruction of the church which had been begun by his father Pepin, and dedicated it in 775 A. D.†

A thoroughly typical example of Carolingian art is a plaque used as the cover of an evangelium in the Bibliothèque Nationale. This work, which came from the Cathedral of Metz, surpasses in conception and execution almost all other productions of the Metz school of carvers, so much so, indeed, that some have seen in it a work of an earlier period, perhaps the sixth century, from the hand of an Italic carver who still retained much of the classic spirit. The vitality and virility of the design is exhibited by the treat-

*See O. M. Dalton, "Byzantine Art and Archaeology," Oxford, 1911, p. 188.

†Labarte, *op. cit.*, pp. 218, 219. From Sugerii, Abb. S. Dionys., "De rebus in admin. sua gestis," apud Duchesne, "Hist. Franc. script.," Vol. IV, p. 331.

ment of the Massacre of the Innocents, where some of the soldier executioners are depicted as having seized the children by their ankles and swung them aloft, prior to dashing out their brains on the pavement before the bloodthirsty Herod.

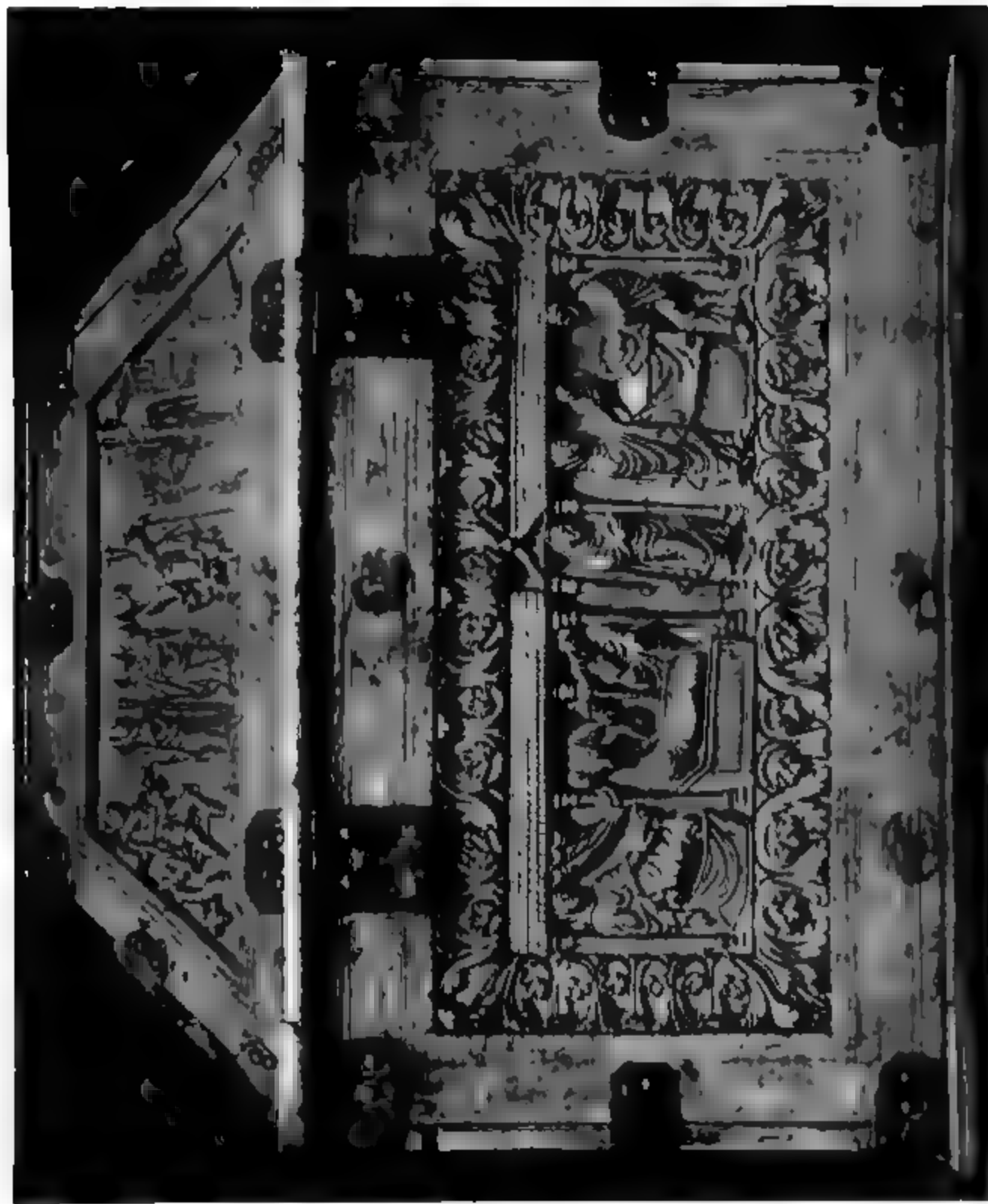
Although the Byzantine ivories of the tenth, eleventh, and twelfth centuries showed an artistic excellence equal to the work of the French ivory carvers of the thirteenth and fourteenth centuries, there is apparent in the designs and execution a certain monotony and conventionality. As a characteristic specimen may be noted the central leaf of a triptych preserved in the Bibliothèque Nationale in Paris, whereon is depicted Christ bestowing a blessing upon the imperial pair, Romanus (1068–1071) and Eudocia, as indicated by inscriptions above the heads of these figures, the entire design showing at once the technical ability of the carver and the lack of originality to be remarked in the work of this place and period.*

The diptych of Rombona in the Vatican Museum is perhaps the most characteristic specimen of early Lombardic medieval work executed under Byzantine influence. On one of the leaves is a representation of Romulus and Remus with the wolf, and above, a medallion with the figure of Christ, who is raising his hand to bless the Greek banner; on the second leaf the Virgin is depicted between two cherubim. An inscription denotes that this diptych came from Ageltruda, wife of Guy, Duke of Camerino and Spoleto, King of Italy and, in 891 A. D., emperor.†

What may be considered as the finest ivory triptych executed by a Byzantine carver is that in the Louvre Museum, known as the Harbaville triptych. It is in perfectly com-

*O. M. Dalton, "Byzantine Art and Archaeology," Oxford, 1911, pp. 227, 228; see Fig. 139.

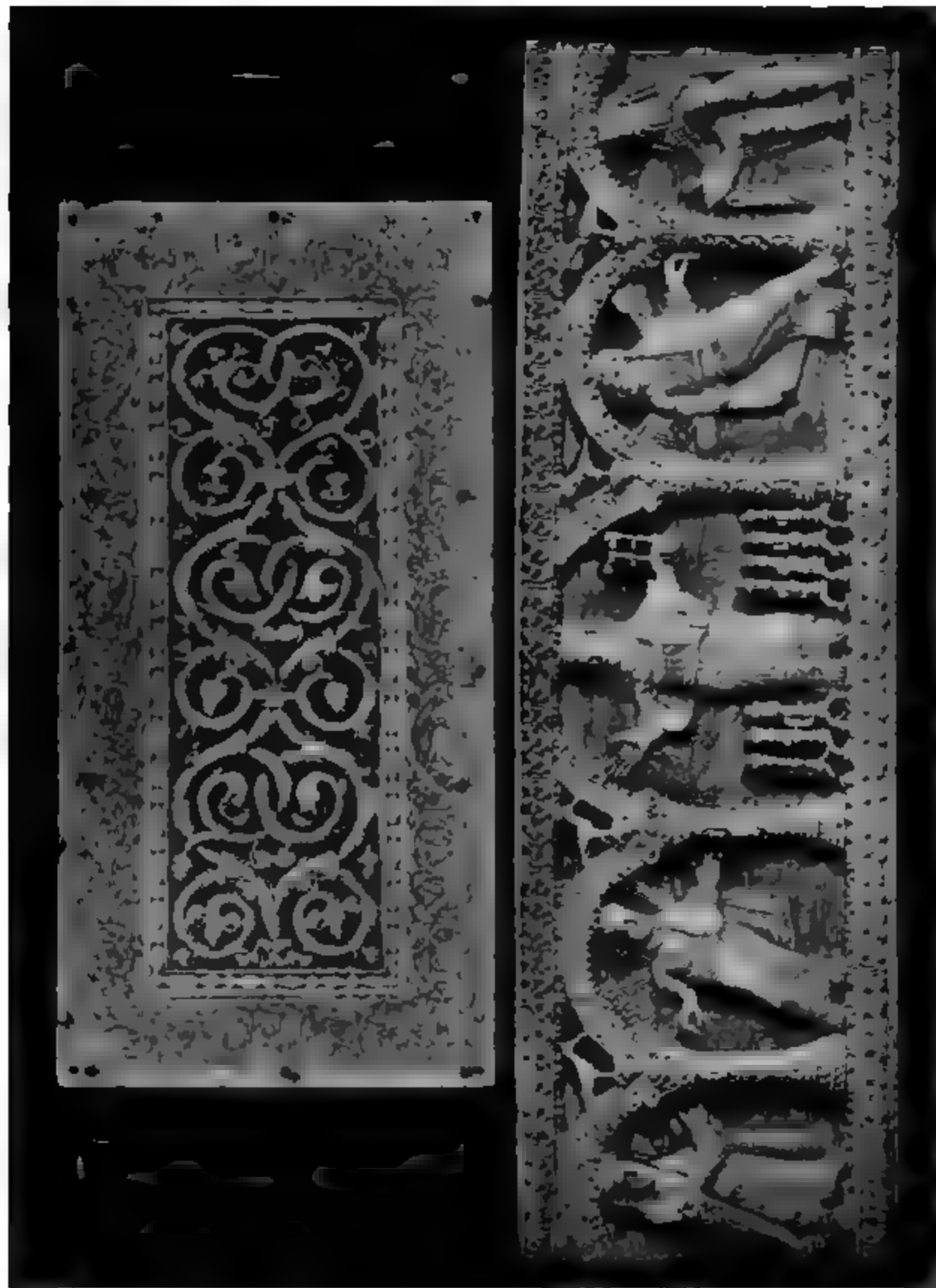
†A. M. Cust, "The Ivory Workers of the Middle Ages," London, 1906, p. 97.



IVORY CASKET

SIDE AND TOP OF CASKET WITH IVORY RELIEFS DEPICTING THE NATIVITY AND THE PRESENTATION AT THE TEMPLE. ROMAN ART OF THE X CENTURY.

MUSÉE DU LOUVRE



I. CARVED BOOK COVER

ITALIAN ART OF THE XIII CENTURY

II. RELIEF-CARVING

REPRESENTING THE CHRIST OF THE APOCALYPSE. GERMAN ART OF THE XI CENTURY

REALE MUSEO NAZIONALE, FLORENCE, CARRAND COLLECTION

7 DIAM.

plete condition and is carved on both the inside and outside faces. The central plaque, divided into an upper and a lower field, offers in the upper part the figure of Christ enthroned; on either side of the elaborate throne stand Saint John and the Virgin; on the lower field are standing figures of St. James, St. John, St. Peter, St. Paul, and St. Andrew. The leaves are similarly divided into two fields: that to the left shows in its upper half St. Theodore Tyron and St. Theodore the Stratalate; below stand St. Eustrates and St. Arethas; above these are medallion heads of St. Thomas and St. Mercurius. On the right leaf, similarly disposed, are figures of St. George and St. Eustache, beneath which are those of St. Demetrius and St. Procopius, the intermediate medallions representing St. Philip and St. Pantaleon. This constitutes what we may call the outside decoration of this richly carved triptych. On the inside, the central leaf bears a large cross, with the starry sky above and plants and animals on the soil beneath; the reverses of the side leaves present images of St. Basil, St. Gregory, St. Nicholas, St. Severin, St. John Chrysostom, and St. Clement of Ancyra, and medallions of St. Phocal, St. Blasius, St. Cosmas, and St. Damien. The central leaf is 24.2 cm. high and 14.2 cm. wide; the side leaves measuring 21.7 cm. in height and 7 cm. in width. This work, done in the tenth century, has both the merits and the defects observable in all products of Byzantine art, the unquestionable excellence and dignity of the composition being marred to a certain extent by the stiffness and rigidity of the figures.*

A tenth-century book cover in the Hofbibliothek in Vienna is adorned with an ivory plaque offering a representation of St. Gregory the Great. The figure, attired in an ancient raiment, falling in stiff folds, is shown seated on a throne

*Musée National du Louvre. Catalogue des Ivoires, par Émile Molinier, Paris [1895-96], pp. 31 sqq.

having accessories of columns and curtains. Around the design, which though somewhat rude is not lacking in power, runs a meander pattern as framework. This specimen of early German art illustrates both the merits and defects of the time and country and is an excellent example of its kind. The inscription surrounding the figure expresses the literary enthusiasm of the time in monastic circles, as it declares that however precious may be the decoration of the book, the "Sacramentarium" of St. Gregory, its contents are still more precious. This copy belonged originally to the Cathedral of Trent.

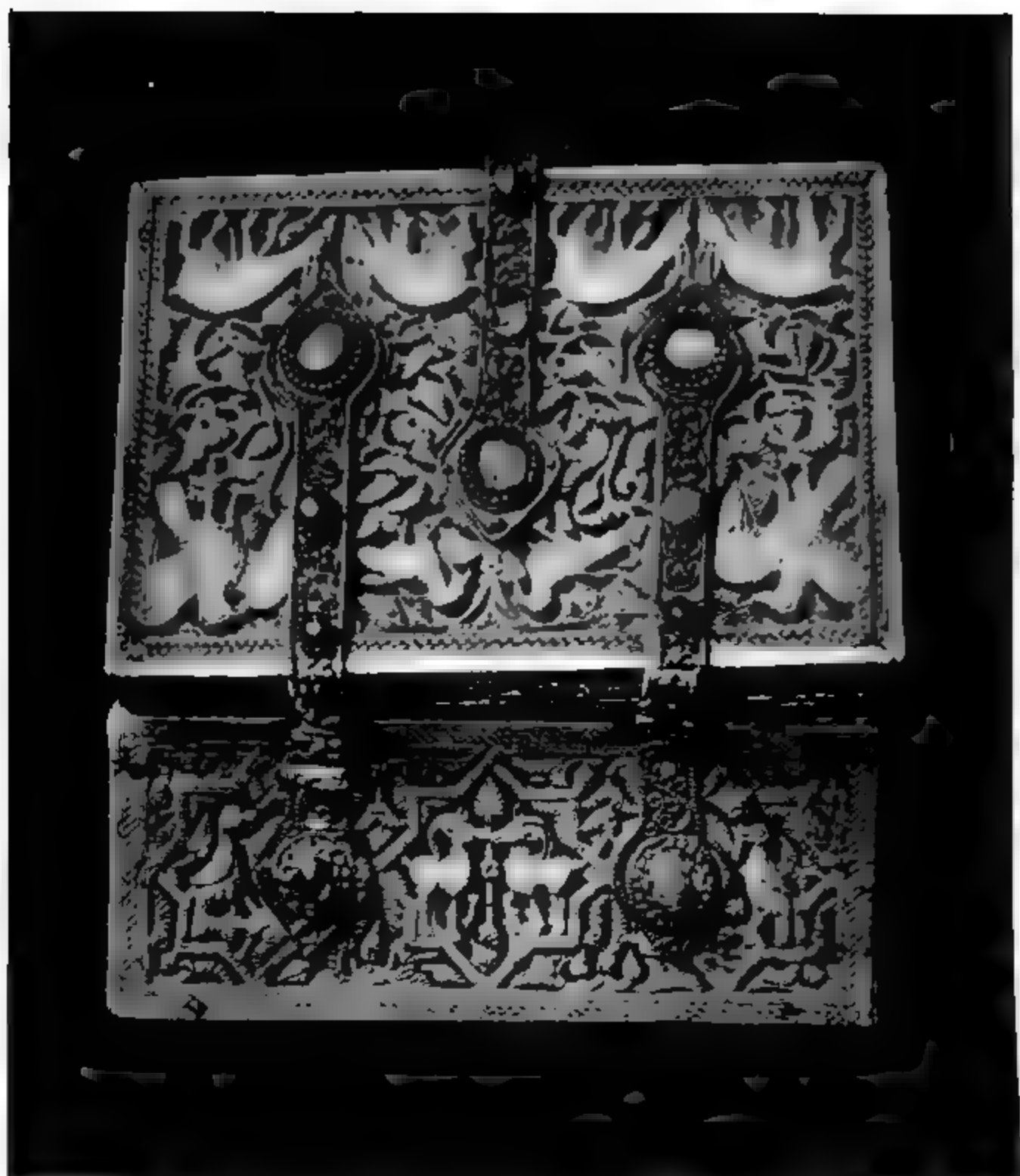
In 1674, the canons of the Cathedral of Metz, feeling themselves under some obligation to Colbert, offered him the ivory treasures of their cathedral. He accepted the gift, and after retaining the valuable and historical objects in his own possession for a time, he donated them to the Bibliothèque Royale. Some further voluntary gifts of ivories were made by the Cathedral chapter of Metz in 1802 to this institution, then and now named the Bibliothèque Nationale. The greater number of these ivory book covers had been provided with a broad binding of elaborate metal work, studded with precious stones, pearls, and enamels; in many instances, in the various revolutionary disorders and consequent plunderings, certain of the more valuable stones were plucked from their settings, these sometimes remaining empty, while at other times the gaps have been filled up with enamel work or with glass imitations. A notable instance of this wilful mutilation of a precious relic of medieval art is the cover of the "Missel de l'abbaye de Saint-Denis," written in the eleventh century. Of the three ivory relief figures that originally adorned it, the central one, that of the Christ, has been wrenched off, doubtless because it bore attached to it some especially valuable jewels; there remain the figures of



COVER OF AN EVANGELIUM

SHOWING IVORY-CARVED FIGURES OF THE VIRGIN AND ST. JOHN, SURROUNDED BY REPRESENTATIONS OF PROPHETS, PATRIARCHS, AND SERAPHIM IN METAL WORK, AND WITH BORDERINGS OF PEARLS AND PRECIOUS STONES.
 $\frac{1}{2}$ DIAM.

BIBLIOTHÈQUE NATIONALE



SIDE AND LID OF AN IVORY COFFER

MOORISH ART OF THE XV CENTURY

$\frac{1}{2}$ DIAM.

REALE MUSEO NAZIONALE, FLORENCE

the Virgin and of St. John, each executed in the spirit of reverent devotion characteristic of this early period, and showing at once a good degree of technical skill, and an unusual power of expression.*

An unnamed German carver of the eleventh century has chosen as his theme the Christ of the Apocalypse. The inspiration of the work seems altogether Oriental. Christ in the central niche has on or in His right hand the seven angel stars, and bears in the left hand the keys of hell and of death; on either side are set the seven candlesticks of the seven churches; in two niches both to the right and left of the central one are an angel and a saint, the saint on the left-hand side of the Christ having a braided beard almost suggestive of the figures in Assyrian sculptures. In spite of its lack of artistic finish this relief has an originality that is quite impressive.

On a specimen of Hispano-Moorish ivory carving shown in 1879, at an exhibition of the Burlington Fine Arts Club, appears the name of a Moorish ivory carver, Khalaf, and as the carving belongs to the first half of the eleventh century, this is one of the earliest signed works in ivory from the Middle Ages. It is a coffret 6 inches in height, on which is engraved, in Cufic characters, an Arabic inscription that has been rendered as follows: "It is more beautiful than a casket adorned with diamonds. It serves to contain spices, musk, camphor, and ambergris. There is nothing for me so admirable as the sight of it. It inspires me with constancy to support the troubles of my house." Certainly the artist could not complain in this case of lack of appreciation. This coffret was owned by Mr. John Malcolm of Poltalloch.†

Of all the medieval ivories, none surpasses in importance

*Henri Bouchot, "Trésors des Bibliothèques, Ivoires des Reliures," p. 6.

†Burlington Fine Arts Club, Catalogue of Bronzes and Ivories of European origin, exhibited in 1879, London, 1879, p. 45, Cabinet VII, No. 270.

and interest the "horn of Ulphus" in York Minster.* The custom of confirming the bestowal of a grant of lands by drinking a draught from such a horn and then giving it duly inscribed to the grantee to be preserved as a record of the donation was fairly general during the Middle Ages in many parts of Europe, and this ivory drinking-horn is a specimen of this class. The circumstances attending the solemn attestation of this particular grant to the see of York, which was made a few years after the death of King Canute (1036 A. D.), are thus related from early sources.†

"About this time also, Ulphe, the son of Thorald, who ruled in the west of Deira, part of the present Yorkshire, by reason of the differences which were like to rise between his sons, about the sharing of his lands and lordships after his death, resolved to make them all alike, and thereupon, coming to York, with that horn wherewith he was used to drink, filled it with wine and before the altar of God, and St. Peter, Prince of the Apostles, kneeling decently, drank the wine and by that ceremony enfeoffed the church with all his lands and revenues. The figure of which horn, in memory thereof, is cut in stone upon several parts of the choir, but the horn itself, when the Reformation in King Edward VI's time began, and swept away many costly ornaments belonging to this church, was sold to a goldsmith, who took away from it those toppings of gold wherewith it was adorned and the gilt chains affixed thereto; since when the horn itself, being entire ivory in an eight-square form, came to the hands of Thomas late Lord Fairfax, in whose possession I saw it in 1666."

On the death of this Lord Fairfax in 1671 the horn passed into the possession of his next relative, Lord Henry Fairfax,

*Archæologia, Vol. I, pp. 168-182, London, 1770; "An historical dissertation upon the ancient Danish Horn kept in the Cathedral Church of York, Anno Domini 1718."

†Sir William Dugdale, "Historical Account of the Church of York," London, 1715, p. 7.

and was by him restored to the custody of the cathedral. It is carved in bas-relief, about the circumference of the lower extremity, with the figures of griffins, a lion, a unicorn, and dogs, interspersed with trees. The original plate, bearing probably the name of the donor, and perhaps a record of his munificent endowment, was lost or removed during the time the horn was in strangers' hands, but a new plate was affixed by Lord Fairfax engraved with the following Latin inscription:

Cornu hoc Ulphus, in occidentale parte Dairae Princeps,
una cum omnibus terris et redditibus suis olim donavit.

Amissam vel abreptam
Henricus D. Fairfax demum restituit
Anno Domini 1675.

Liturgical combs of ivory formed one of the more important categories of medieval ivory carving, and an exceedingly fine specimen, of German workmanship, from the eleventh century, is now in the Louvre Collection. It is of rectangular form, carved on both faces, and is provided with two rows of teeth, the upper being fine and the lower coarse. The front carving shows Samson rending the lion's jaw; on the reverse side is a foliage decoration with spirals and tendrils. This comb is 19.5 cm. in height and 10.5 cm. wide.*

One of the finest examples of Byzantine art in ivory is a triptych in the Bibliothèque Nationale at Paris. On the central leaf is depicted the Crucifixion, beside the cross are the figures of Mary and of John, in a compartment above appear the archangels Michael and Gabriel, while a compartment beneath the cross shows representations of Emperor Constantine and of his mother, St. Helena. The right

*Musée National du Louvre; Catalogue des Ivoires par Émile Molinier, Paris [1895-6] p. 48.

and left wings of the triptych offer one beneath the other the busts of ten saints, five on each wing; on the left wing, John the Baptist, St. Paul, St. Stephen, St. Chrysostom, St. Cosmas; on the right wing, Elias, St. Peter, St. Pantaleemon, St. Nicolaus, and St. Damianus. As will be observed, the arrangement is symmetrical, the saints opposite each other being more especially connected historically or otherwise. In each case the name of the saint in Greek characters accompanies and explains the bust. Indeed, all the figures are thus explained. Beneath the cross is the iambic inscription:

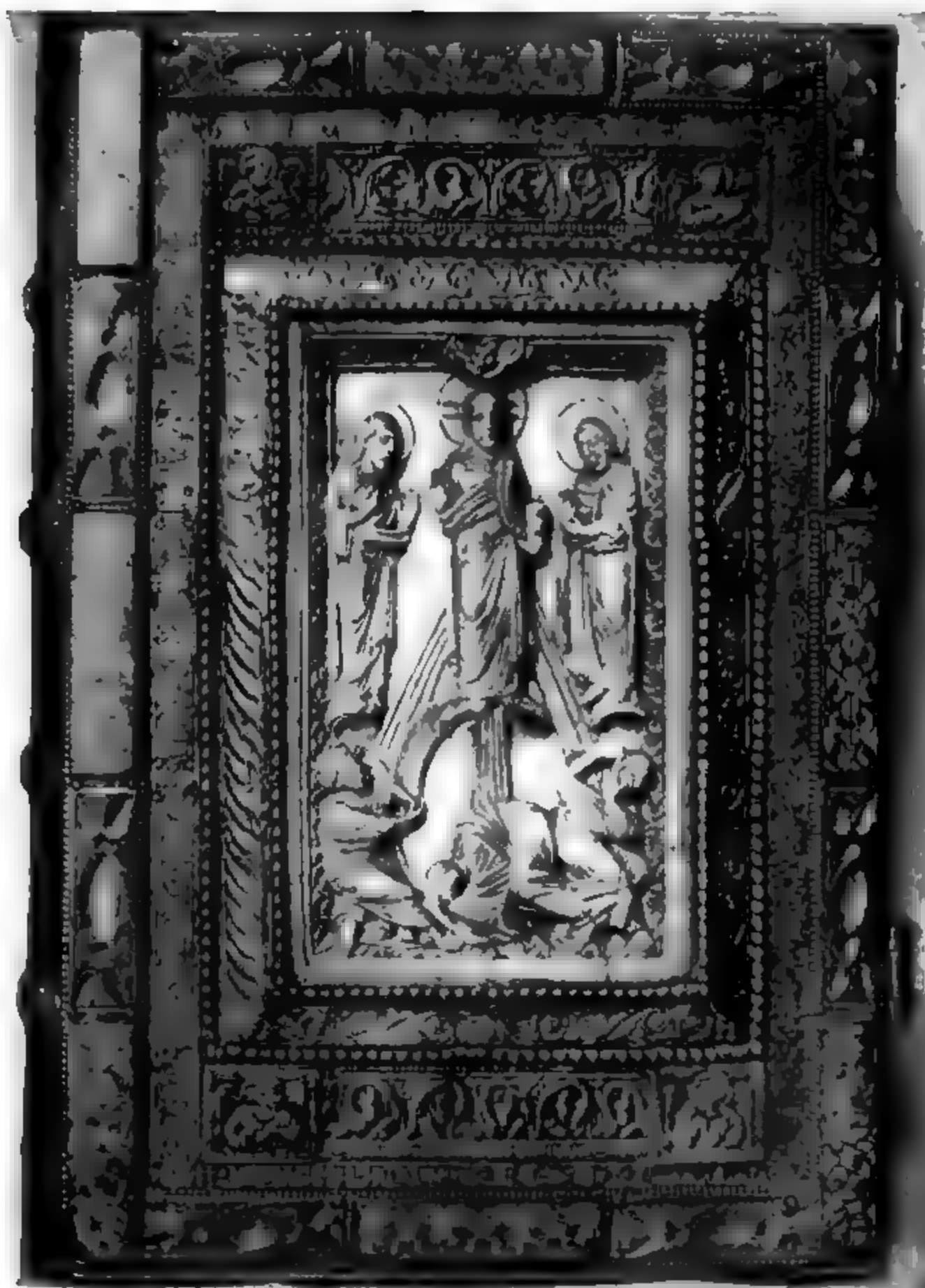
ΩΣ ΣΑΡΞ ΠΕΠΙΟΝΘΑΣ ΩΣ ΘΣ ΠΑΘΩΝ ΛΤΕΙΣ

“As man [in the flesh] thou hast suffered, as God, after suffering, thou redeemest.”* This triptych is 11 in. high and 9½ in. wide.

A Byzantine carving of the twelfth century in the Bibliothèque de l’Arsenal, Paris, and which forms the centre of the cover of an evangelium exhibits the artist’s sense of the overpowering majesty of the Transfiguration, that sense of the almost crushing power of the divine that is manifested in many Byzantine mosaics, and in the early Italian paintings produced under Byzantine influence, in the art of Ravenna, as in the pictures of Cimabue. This overmastering faith in the divine power lends a dignity and force that offsets many artistic failings.

One of the arms of a cross carved out of ivory by a Spanish artist of the twelfth century, and now in the Louvre, shows a curious bordering of birds and animals including a very lifelike parrot and two of the fabled dragons or griffins so dear to medieval fantasy. As a choice bit of bordering the work possesses unquestionable merit, and testifies to the excellence of the Spanish carvers of this period, who

*M. Digby Wyatt, “Notices of sculpture in ivory,” London, 1856, Plate opp. p. 42.



IVORY CARVED COVER OF AN EVANGELIUM

BYZANTINE ART

$\frac{1}{2}$ DIAM.

BIBLIOTHÈQUE DE L'ARSENAL, PARIS



ONE OF THE ARMS OF A CROSS
SPANISH ART OF THE XII CENTURY

1 DIAM.

MUSÉE DU LOUVRE

may have owed much to instruction or example of Moorish artists although their designs were of course very different.

A special class of triptychs, of which a great number were produced by the medieval and Renaissance ivory carvers, have on the central panel or leaf the figure of the Virgin with three angels, two of whom bear tapers, while the third is placing a crown on the Virgin's head; on the side leaves are depicted scenes from her life. Sometimes, when the figure of the Virgin is not carved in relief, but has the form of a statuette beneath a canopy, there are four leaves instead of three only as in the triptych proper. Occasionally, in the more elaborate works of this type, the central leaf bears a representation of the Crucifixion or the Last Judgment.*

Among the many valuable medieval ivories in the J. P. Morgan collection, for some time exhibited in the Metropolitan Museum of Art, New York, may be noted a statuette of the Virgin and Child, the work of a French carver of the fourteenth century. The mother, enthroned, while gazing down fondly upon her son, holds up in her extended hand a small bunch of lilies, toward which the Divine Child stretches forth its hand. Both in expression and execution this work ranks among the very best products of this period, when the art of religious ivory carving stood at its highest point. The French art of the fourteenth century is also shown at its best in the reliefs of a diptych acquired by Mr. Morgan from the Hoentschel Collection. Here each leaf is divided into four longitudinal sections, those on the upper half offering representations of the flagellation of Christ, the Crucifixion, the Resurrection, and the Coronation of the Virgin, while the four lower sections figure the Annunciation, the Nativity, the Adoration of the Magi, and the Pres-

*Dalton, "Catalogue of the ivory carvings of the Christian era and carvings in bone in the Department of British and Medieval Archaeology and Ethnology in the British Museum," London, 1909, p. 95; see Pl. LVIII (No. 266); French, 14th cent.

entation in the Temple. The execution is lifelike and effective, without any striving after effect. More archaic and perhaps even more devotional, although artistically less successful, is a thirteenth century diptych, also of the French School, where the six relief carvings, three on each leaf, give in succession, the Entry into Jerusalem, the Washing of Feet, the Last Supper, the Garden of Gethsemane, the Betrayal by Judas, and the Crucifixion. In marked contrast to the sobriety of this work is a French diptych of the fourteenth century in which the representations are much more lifelike and dramatic, but less deeply imbued with a purely religious spirit; there are here but four designs, the Entry into Jerusalem, the Last Supper, the Betrayal, and the Crucifixion, but the carver has been strikingly successful in the grouping of the figures and in their individual attitude and bearing. The masterly execution and the dramatic intensity of these compositions would lead us to suppose that this diptych belongs to the very end of the fourteenth century.

The peerless Morgan Collection embraces among its other treasures of medieval art a remarkable ivory polyptych, of four leaves, carved with a series of representations of the Passion, the work being done in a manner characteristic of Gothic art in ivory carving at its very best. Each of the sad scenes, eight in number, is feelingly depicted, sometimes but three figures entering into the composition, while in others as many as eight are not unskilfully crowded into the narrow compass of the panel. All the carvings are animated by the earnestly religious spirit of the Early Renaissance, to which period this valuable and interesting work belongs.

The Coronation of the Virgin, in the Louvre Museum, has long ranked as one of the most important productions of the French carvers of the thirteenth century. While it is impossible to deny that the composition is rather rigid in outline and lacks the beauty of some later works of the French



CORONATION OF THE VIRGIN
FRENCH ART, END OF XIII CENTURY

MUSÉE DU LOUVRE



MIRROR CASES

FORMERLY IN ST. DENIS. FRENCH ART OF THE XIII CENTURY

MUSÉE DE CLUNY, PARIS

3 DIAM.

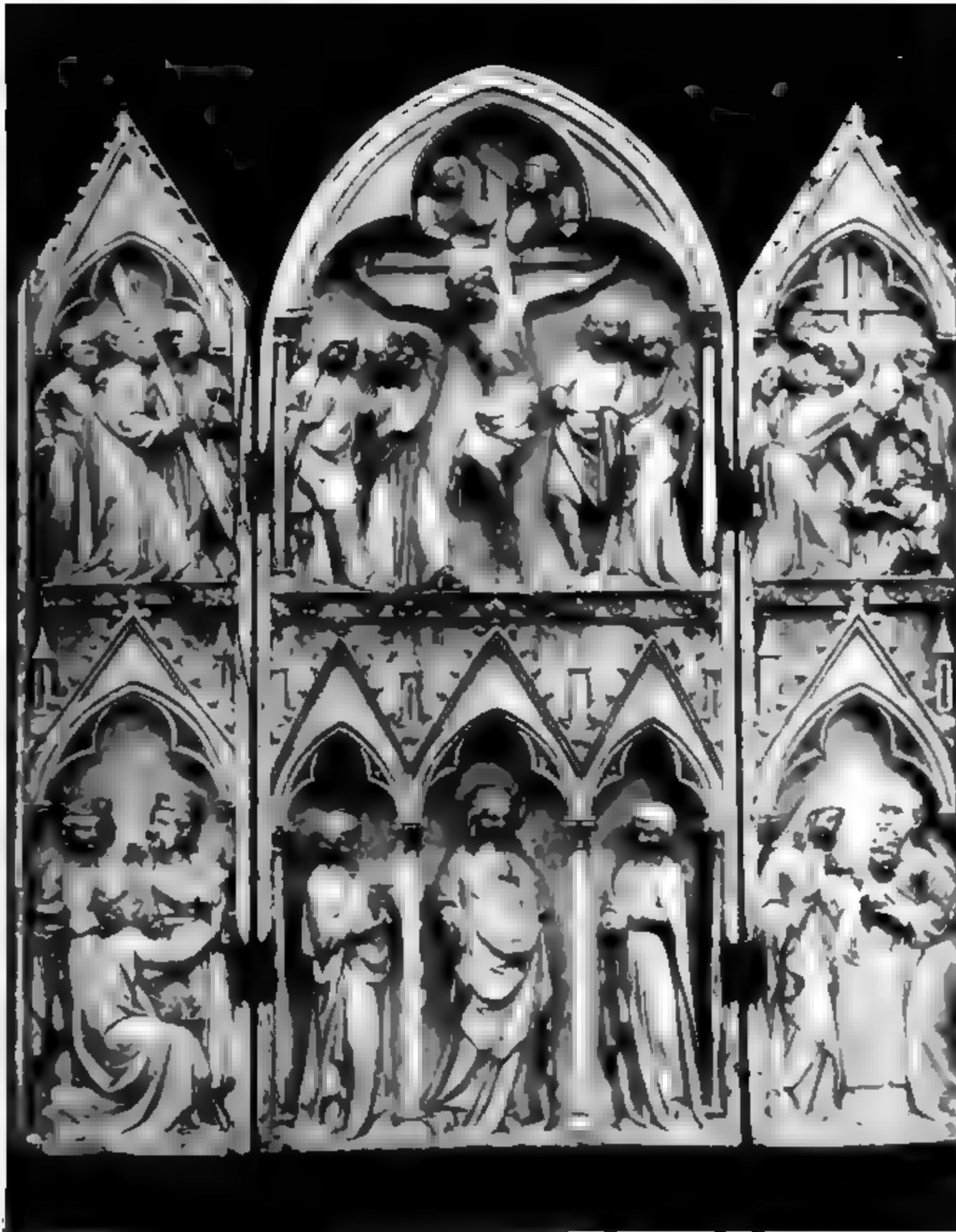
School, the spirit of reverence and earnestness it breathes brings it in line with the pre-Raphaelite paintings of the early Italian masters. The two angels suggest in a marked degree the type made so familiar to us by the half-inspired hand of Fra Angelico, who flourished nearly two centuries after the date of this ivory. Much of the polychrome decoration of this carving still remains; the flesh, the hair, and the beard are tinted, the lining of the garments is painted sky-blue. For some time only the principal figures of this group were in the Louvre, for which they were acquired at the sale of the splendid Soltykoff Collection. In 1878, however, the city of Chambéry sent to the Exposition d'Art Rétrospective in the Trocadéro two angel-figures, which were quickly recognized by connoisseurs as having formed part of the original group, and the municipality of Chambéry consented to cede them by exchange to the Louvre. That this carving may have been that listed in the inventory of Charles V of France, in 1380, is conjectured by M. Émile Molinier* who cites the following item: "Ung couronnement de Nostre-Seigneur à Nostre-Dame, d'yvire, et trois angelotz de mesmes, assiz en ung siège de cèdre." That *three* angels are here noted whereas but two are now to be seen is not considered by Molinier as an absolute bar to the identification in view of the occasional inexactness of these early lists. Perhaps, however, as the two angels now in place were only recovered by a happy chance, a third stray angel may be hidden away in some of the many collections of medieval ivories.

French ivory carving of the fourteenth century is chiefly distinguished for the chaste beauty of its productions in the field of religious art, but it also offers a few notable examples of works designed to illustrate episodes of secular poetry. One of the most important of these works is a casket of

*Musée National du Louvre; "Catalogue des Ivoires," Paris, 1896, p. 115.

elongated form and with a flat cover, now in the Louvre Museum. On each of its faces appear bas-reliefs depicting scenes from the thirteenth century poem: "La Chastelaine de Vergi."* A brief description of the figures carved on the cover will indicate how well the medieval carver has understood his task of illustrator. Of the eight compartments into which the cover is divided by moulding, a fret-work of silver, the first (from the left) shows us a lady with a dog, in conversation with a friend; in the next compartment "la dame de Vergi" is seated on a bench and training her pet by means of a threatening whip; next we see the lady directing her faithful dog to go in search of her friend, who receives him and pats him on the head; the fourth compartment depicts the chatelaine seated on a bench beneath some trees, and discussing with her friend the part that is to be played by the dog in favoring their loves; for, according to the poem, if the friend sees the little animal trotting along through the orchard this is to be a sign for him that his lady-love is alone in her chamber; in the fifth compartment are figured the lady and her friend at their rendezvous; in the three remaining compartments of the cover, and on the sides of the casket, the bas-reliefs illustrate the progress of the tale, which is complicated by an unlawful passion for the chatelaine's friend on the part of the "Duchess of Burgundy," who, when her advances are spurned, seeks to spur on her husband, the duke, to kill the unresponsive object of her lawless regard. However, the true state of the case is revealed to the jealous duke by the lover, and his life is spared; but the vengeance of the duchess is not to be appeased, and by publicly taunting the poor chatelaine with her amorous adventure, she drives her to despair and death, and when the lover, uneasy at not seeing her, seeks her and finds her dead, he kills him-

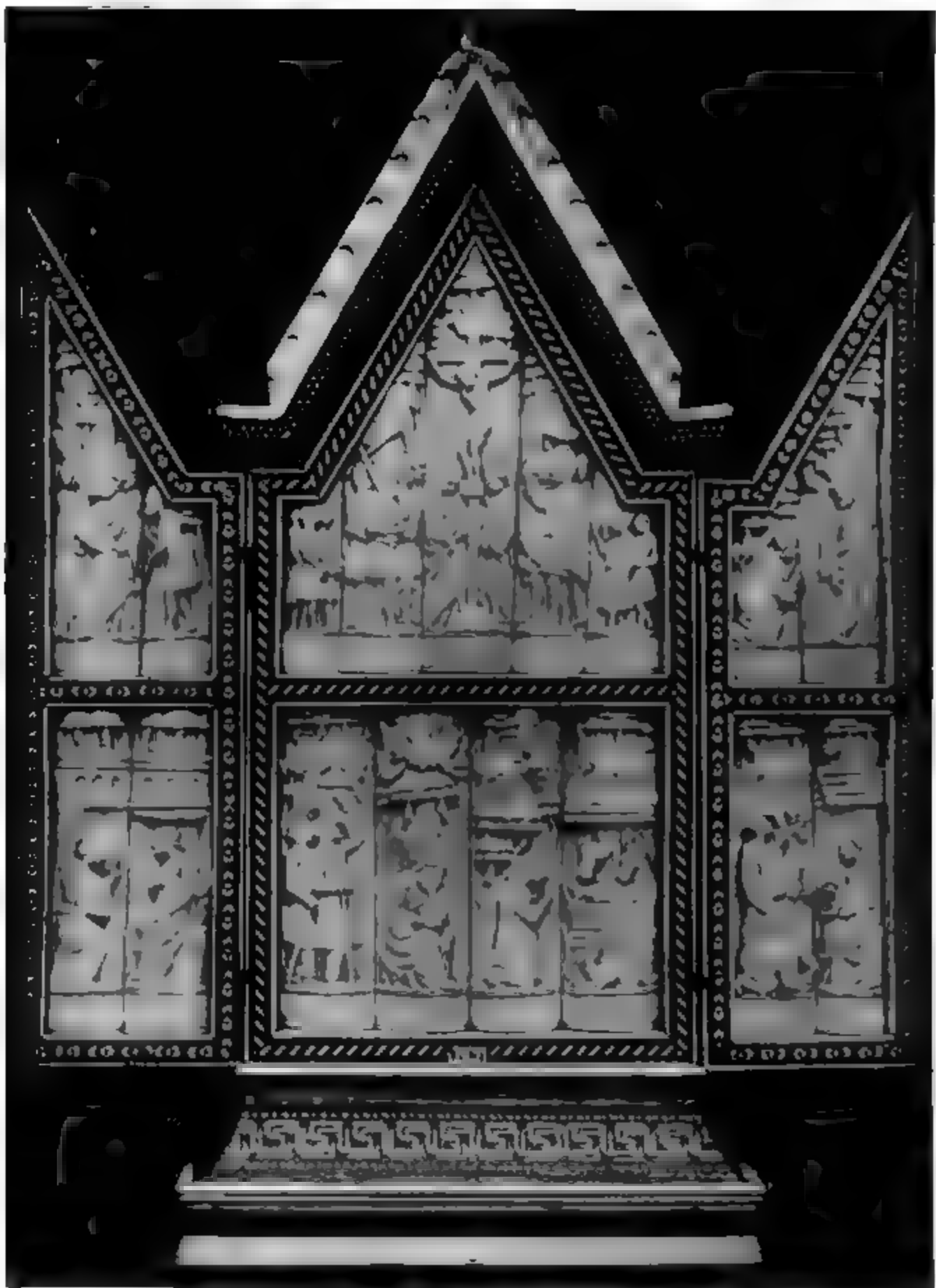
*Musée National du Louvre; "Catalogue des Ivoires," par Émile Molinier, Paris [1895-96], pp. 141-154.



IVORY TRIPTYCH

CARVED WITH SCENES FROM THE NEW TESTAMENT, AND WITH FIGURES OF THE VIRGIN AND TWO ANGELS IN THREE GOTHIC NICHES. FRENCH ART OF THE XIV CENTURY.
3/4 DIAM.

MUSÉE DE CLUNY, PARIS



TRIPTYCH

ITALIAN ART OF THE XIV CENTURY. SCENES FROM THE NEW TESTAMENT

MUSÉE DE CLUNY. PARIS

self in despair. In the end poetic justice is to a certain extent satisfied by the death of the wicked duchess at the hands of her husband. The carvings devoted to the scenes of this tale, and a few other works of this type, exemplify the artistic range of some of the medieval French ivory carvers, whom we might suspect of undue one-sidedness in an exclusive devotion to religious themes.

One of the very best specimens of the French carver's art of the fourteenth century is a triptych in which the artist has successfully utilized the small space at his disposal without unduly crowding it with figures, and has known how to balance his composition perfectly and at the same time treat the separate parts with thorough freedom. The Crucifixion occupies the upper half of the central panel, below this, in three Gothic niches, are graven figures of the Virgin and two ministering angels. On the side panels are depicted the Purification of the Virgin, the Presentation of the Infant Jesus in the Temple, Christ bearing the Cross, and the Deposition from the Cross. Within its somewhat narrow limits this work deserves all praise for the grace and dignity of the designs.

The elaborate ivory known as the "Oratory of the Duchess of Burgundy," now in the Musée de Cluny, was originally one of the chief treasures of the Chartreuse de Dijon, and was sold with the other valuables of this foundation pursuant to the Revolutionary decree ordering the sale of the ecclesiastical treasures. In the registers of the Chartreuse appears the following interesting entry in the accounts for 1392-1393:*

"Payé 500 liv. à Berthelot Héliot, varlet de chambre du duc [Philippe le Hardi], pour deux grant tableaux d'ivoire a ymaiges, dont l'un d'iceulx est la passion de Notre-Seigneur et l'autre la vie de monsieur saint Jean-Baptiste."

*E. de Sommerard, "Catalogue du Musée de Cluny," Paris, 1881, p. 84.

The 500 livres of this time represented a weight of silver worth at least \$2,000 intrinsically, and of course much more if measured by its purchasing power, fivefold or perhaps even tenfold that of our day. We cannot help regretting that the treasurer, while noting the name of the seller, the "varlet de chambre" of the Duke of Burgundy, quite forgets to give us the name of the humble artist. The "monsieur saint Jean Baptiste," a form not unusual in the older French, seems strange enough to-day, when the primal sense of *monsieur*, "my lord," has been quite forgotten. Of course even in these early times *monseigneur* signified a higher rank than *monsieur*.

Two ivory mirror cases, one in a fragmentary state, are to be seen at the Musée de Cluny, and in time long past formed part of the rich collection of the Abbey of St. Denis. As ornamental adjuncts of articles used for the toilette the carver has selected for his designs subjects drawn from the romances of chivalry. In the unbroken case chimerical figures form the corners. The treatment is unrestrained and yet not in the least too free, and there is a notable softness both of forms and draperies.

Venetian ivory carving is well exemplified in a retable preserved in the Musée de Cluny. This is a fourteenth-century work, the subjects depicted on the central leaf being, the Crucifixion, the Vision of the Shepherds, and the Nativity. On the right-hand leaf are the Betrayal by Judas and the Annunciation, on the left-hand leaf the Apparition to Mary Magdalen and the Adoration of the Magi. The execution is carefully finished, and although there may be no high inspiration, there is both dignity and harmony in this production of North Italian art.

The free use of gilding and colors to enhance the effect of ivory has already been noted, and we have an interesting example of this in a bas-relief in the Musée de Cluny, the



IVORY BAS-RELIEF

COLOURED AND GILDED, WITH FIGURES OF THE VIRGIN AND CHILD AND OF FOUR SAINTS.
ITALIAN ART OF THE XIV CENTURY.
 $\frac{1}{2}$ DIAM.

MUSÉE DE CLUNY, PARIS



EPISCOPAL CROZIER

FRONT AND BACK VIEW

**ONE SIDE SHOWING THE VIRGIN AND INFANT JESUS, THE OTHER, THE CRUCIFIXION. FRENCH
ART OF THE XIV CENTURY; MOUNTING OF THE XV CENTURY**

MUSÉE DE CLUNY, PARIS

production of an Italian carver of the fourteenth century; this is a fragment of a triptych. In the middle of the central panel are the Virgin and Child; on either side are two female saints; and still farther to the right and left, respectively, are figures of St. Peter, with his massive key, and of another male saint, bearing a drawn sword; all the saints carry books in their left hands. While undoubtedly the addition of colour serves to make the figures more lifelike, a finer artistic effect is attained by trusting to the fair-toned ivory alone.

The ivory carving of the Early Renaissance period, and indeed some specimens of an even earlier date, show that the same religious inspiration that developed Gothic architecture was working in this branch of art also. Out of the great wealth of examples of this, which might well be termed the Golden Age of ivory carving, one of the very finest specimens is a carving on a piece of ivory that appears to have formed part of a pastoral staff. The subject is a Pietà, or representation of the Virgin Mary holding the dead Christ in her arms, and the overpowering love and pity of the Virgin Mother have never found truer and more touching treatment than here.*

The elaborately carved pastoral staffs in ivory produced in the Middle Ages often bore on one side of the volute the Crucifixion, and on the other side the Virgin and angels. A symbolic meaning was attributed to the different parts of the staff, namely, the crook, the rod and the point, thus expressed in a medieval Latin verse: "I draw in sinners, exhort the just, and prick the erring."

In the "Liber Regalis" containing a coronation ritual prepared in 1373 by Nicolas Littlington, Abbot of Westminster, it is provided that in case the king's hair should fail

*William Maskell, "Ivories Ancient and Modern," pp. 103, 104, South Kensington Museum Art Handbooks, No. 2.

to lie smooth after the ceremony of anointing has been performed, the hair should be combed with St. Edward's ivory comb. This was no longer to be found among the appurtenances of the regalia when search was made for everything of value by the Parliamentary Commissioners in 1649; they could only find "an old comb of horne."*

The beautiful Sainte Chapelle in Paris, one of the earliest monuments of Gothic art, preserved in 1480 a valuable and striking example of medieval ivory carving, which is described in the inventory made at that date. This was an ivory statuette figuring the Virgin Mary and Infant Jesus, set on a silver-gilt base, on which were enamelled the arms of France upborne by four lions. The crown on the Virgin's head was enriched with eight large round pearls and four smaller ones, these being carefully noted as "Orient pearls." On the breast of the image was set a very large square emerald, and on one of the fingers was a golden ring also bearing an emerald. On the breast of the child Jesus was placed a *cameheus* (an antique engraved gem).†

A splendid specimen of early fifteenth-century carving was the work donated by Jean, Duc de Berry, in 1408, to the Abbey of Poissy. This is now in the Louvre Museum, having been taken from the abbey by the Revolutionists in 1794 and transported to the Château of St. Germain-en-Laye, whence it was transferred to the Louvre April 13, 1796. This is one of the largest carvings in ivory that has ever been executed, and consists of a base, having fourteen niches, and supporting a number of graceful columns and arches on which rest two belfrys. On these are twenty angel figures, ten at the right-hand and ten at the left-hand side;

*William Jones, "Crowns and Coronations," London, 1902, p. 291.

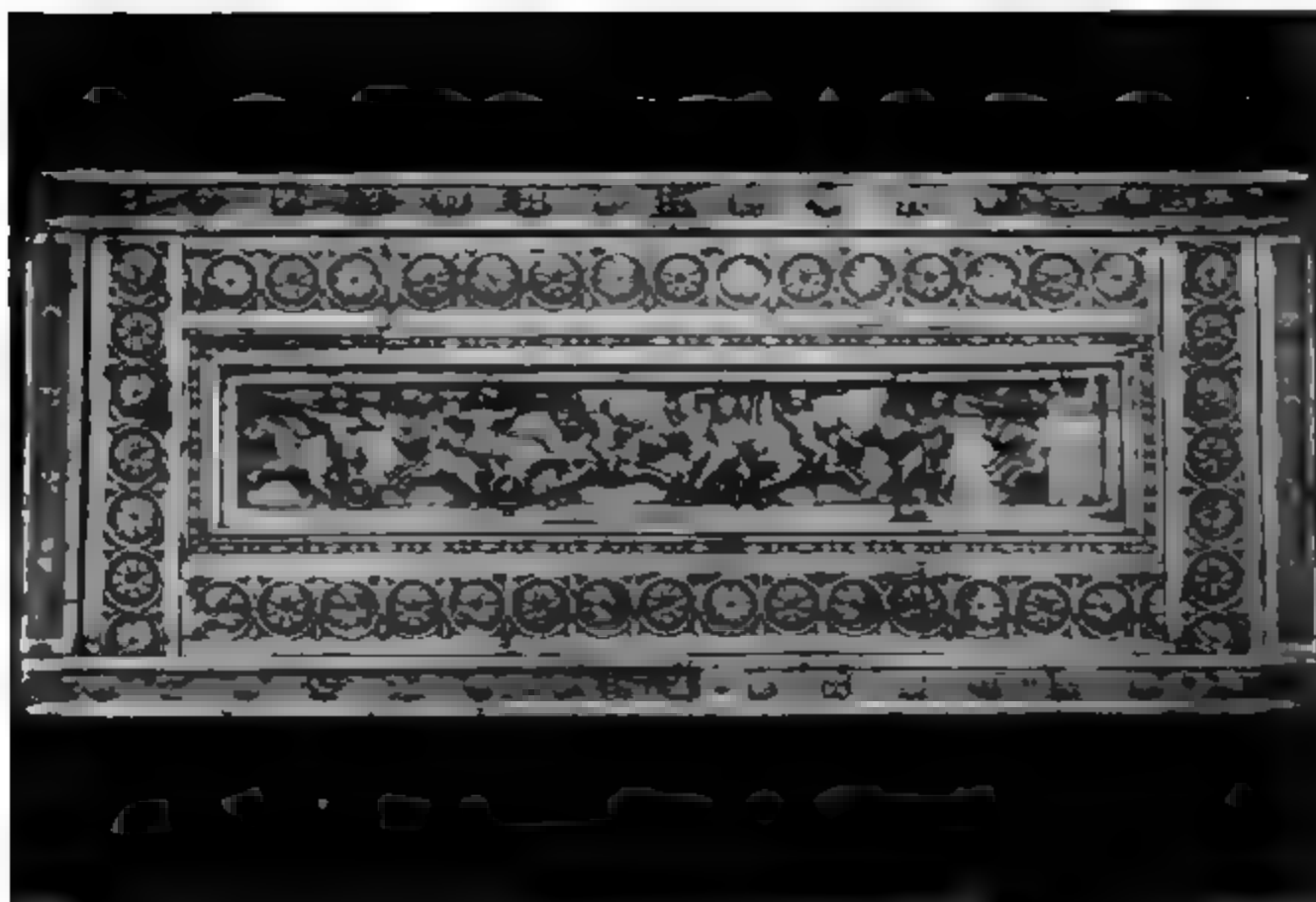
†Trésor de la Sainte Chapelle, Bib. Nat., MS. lat. 9941; fol. 20 of original, and fol. 61 of transcript in author's library from the collection of the late M. É. Molinier, Director of the Louvre.



VIRGIN AND INFANT JESUS

FRENCH ART OF THE XIV CENTURY. ON THE VIRGIN'S HEAD IS A GOLD CROWN ENRICHED WITH PEARLS AND PRECIOUS STONES. THIS STATUETTE IS BELIEVED TO BE IDENTICAL WITH ONE DESCRIBED IN AN INVENTORY OF THE SAINTE CHAPELLE MADE IN 1480.

MUSÉE DU LOUVRE



I. LOWER SIDE OF A CASKET

BYZANTINE ART OF THE IX CENTURY

II. PORTABLE ALTAR

GERMAN ART OF THE XII CENTURY

MUSÉE DE CLUNT, PARIS

the arms of France and of Berry are also carved on the face of the towers. Around the base are the figures of the twelve apostles. In one of the two largest niches is sculptured the Duc de Berry, uncle of Charles VI of France, accompanied by his patron and an angel, and his wife, Jeanne Comtesse d'Auvergne et de Boulogne, similarly accompanied. The various sides bear numerous groups of bas-reliefs, one set illustrating the life of St. John the Evangelist.*

A considerable number of guilds were engaged in ivory carving in Paris in the thirteenth century, either using this material exclusively, or in connection with others. M. Henry Havard† calls attention to the fact that M. Labarte, in enumerating but three such guilds, has underestimated their number as reported in the "Registres de Mestiers et Marchanderies de la Ville de Paris," by Étienne Boileau, appointed "garde de la prévôté de Paris" in 1258, by Louis IX. Besides the "ymagiers tailleurs," the "peintres et tailleurs-ymages," and the "fabricants de tables à écrire," we must add the "couteliers faiseurs de manches" (knife-handle makers), the "paternostriers faiseurs de noyaux à robes" (rosary makers and those making beads for dress-trimmings), the "pingniers et lanterniers de Paris," who were permitted to work in bone and ivory and, lastly, the "déciers, faiseurs de dés à tables et à eschiés" (makers of checker pieces and chessmen, as well as of dice). Thus no less than seven of the corporations made use of ivory in their work.

Of the thirteenth-century ivory carvers the "Livre des Mestiers de Paris" gives, under Title LXI, the following: "Whosoever wishes to become an image-maker (*ymagier*)

*See Émile Molinier, Musée National du Louvre; "Catalogue des Ivoires," Paris [1896], pp. 217-232.

†Henry Havard, "Dictionnaire de l'ameublement," Paris, n. d., Vol. III, cols. 59, 60. Article *Ivoire*.

in Paris, that is to say, a carver of crucifixes, knife-handles, and all other manner of carving, whatever it may be, of bone, ivory, or wood, and of any other materials, whatsoever they may be, can do so freely." It is further specified that the figures must be made of a single piece of ivory, except in the case of crucifixes, which are to be of three pieces.* Title XVIII notes the makers of ivory combs.

In the "Description de Paris," composed by Guillebert de Metz and dating from 1407, mention is made of a Rue de la Tableterie where dwelt those who made combs and "tables" (plaques) and other "images" of ivory, and in the still earlier "Us et Mestiers de Paris," of Boileau, we are told that the *imagiers tailleurs*, the image-carvers, were free because their trade was exclusively at the service of Our Lord and of his saints, and pursued to the honour of Holy Church.†

While but few names of the early French ivory carvers have been preserved for us, we know of Jean le Scelleur, who worked for Philippe V, surnamed Le Long (c. 1293–1322), and for Mahaut, Comtesse d'Artois;‡ of Jean le Braeillier, mentioned in the inventory of Charles V of France (1337–1380),** and of Jean de Coilly and Jean Aubert, whose services were employed by the dukes of Burgundy.§ Evidently these ivory carvers, however artistic may have been their work, were not put on a par with the painters and sculptors, and this comparative lack of appreciation was not calculated to induce them to sign their works. A pax in the British Museum was at one time believed to furnish the name of a medieval carver, Jean Nicolle, but later research and criti-

*Boileau, "Le Livre des Mestiers de Paris," ed. Lespinasse and Bonnardot, Paris, 1879, Vol. I, pp. 127, 128.

†M. Digby Wyatt, "Notices of Sculpture in Ivory," London, 1856, p. 17.

‡Richard, "Mahout comtesse d'Artois et de Bourgogne," Paris, 1887, p. 321.

**Labarte, "Inventaire de Charles V," Paris, 1879, p. 281.

§Prost, "Inventaires mobiliers des ducs de Bourgogne," Paris, 1902-3, Vol. I.

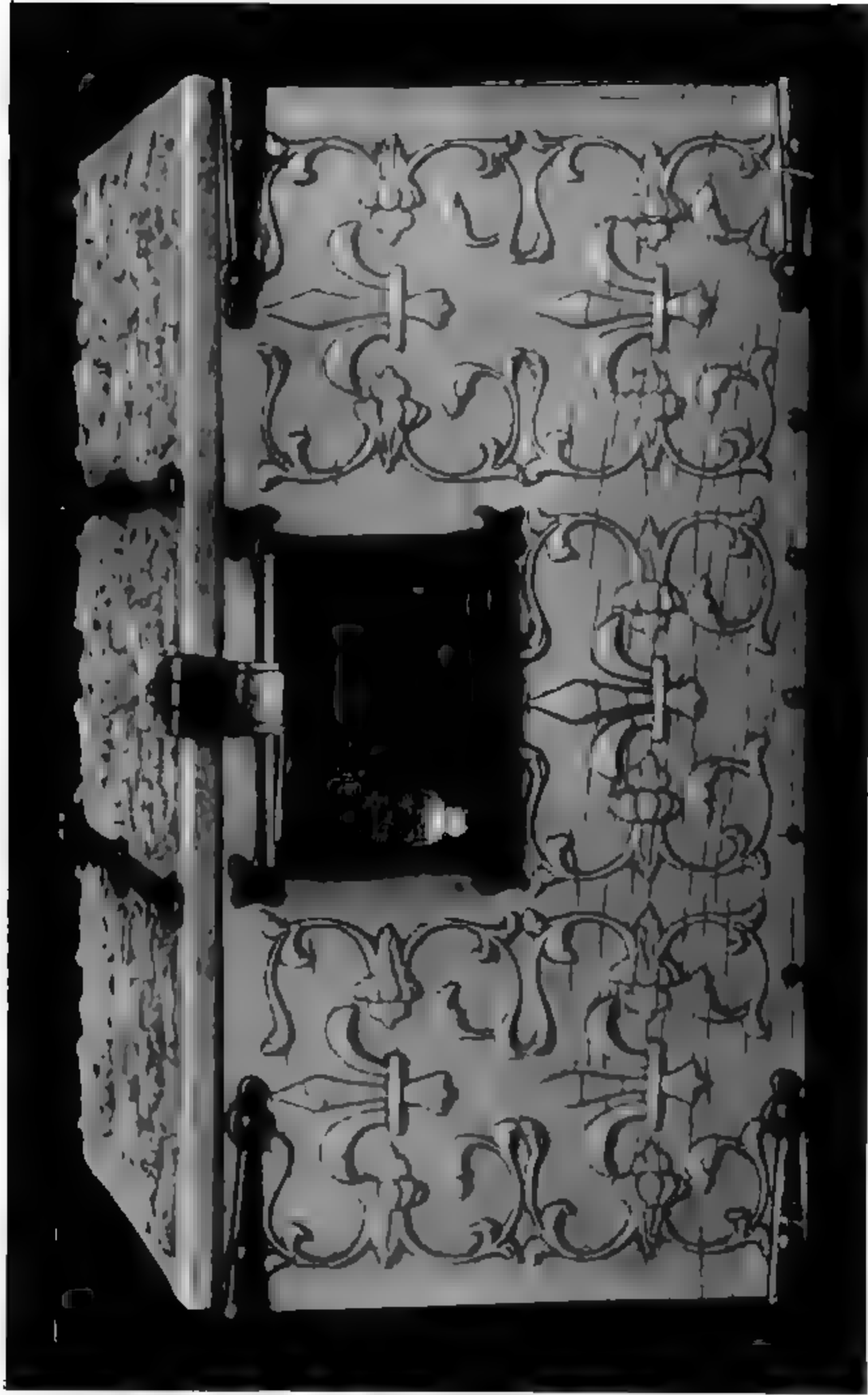


DIPTYCH WITH RELIEF CARVINGS OF SCENES FROM THE PASSION

FRENCH ART OF XIV CENTURY

3 DIAM.

MUSÉE DE CLUNY, PARIS



IVORY CASKET

CARVED IN RELIEF WITH FLEUR-DE-LYS AND FOLIATE SCROLLS; BRASS LARK AND KEY FRENCH, END OF THE XVI CENTURY. EXACT SIZE
COLLECTION OF GEORGE HALTING, EMQ

cism has dispelled this belief, and it seems that we must regard this signature as that of the owner rather than that of the carver of the pax.

There is record of an important school of ivory carvers established in Venice in the early part of the fifteenth century, its founder being a certain Baldassare degli Embriachi, a Florentine by birth, who had resided for some time in Genoa before finally settling in Venice; and who thus enjoyed the educational influences of the art circles of the three cities—Florence, Genoa, and Venice. He was not only an artist, but must have been endowed with considerable practical ability, for he was a banker, and also for a time, from 1389 to 1409, a political agent of Duke Giangaleazzo of Milan. Two other younger members of the family, Ser Giovanni (died before 1433) and Ser Antonio (died before 1431) belonged to this school, which was more especially renowned for the production of a great number of beautiful nuptial caskets. These eminently artistic objects were the more appreciated that French ivory carving, which reached its highest development in the fourteenth century, was already declining in excellence. Baldassare's practical abilities are believed to have been of even more value in the development of the school he founded than his purely artistic gifts, enabling him to systematize and order the Venetian workshop like a well-organized industrial factory. As many as 124 of these caskets have been traced in the various public and private collections of Europe, one of the finest specimens having been brought to the Ambrosian Collection in Vienna, by the marriage of Claudia dei Medici to Archduke Leopold V, in 1627.*

The rather excessive naturalness of much Flemish art, even that of its great masters, appears unmistakably in

*Julius von Schlosser, "Die Werkstätte der Embriachi in Venedig"; *Jahrbücher der kunsthist. Samml.*, Vol. XX, pp. 220-232; Vienna, 1899.

the Virgin and Child of a Franco-Flemish artist who worked in the fourteenth or the beginning of the fifteenth century. This highly characteristic work, in the Louvre Museum, shows a high degree of technical skill on the part of the carver, and we must admit the effectiveness of the child figure's pose, the ardent appetite testified to by the spasmodically lifted foot; however, this can hardly help to bring out the religious and sacred meaning of the subject, neither can we find in the insignificant though pretty face of the Virgin any trace of nobility or dignity. The whole composition is "of the earth earthy."

Several representative examples of Italian and Flemish ivory carving were disposed of in February, 1865, in Paris, at the sale of the collection of Comte de Pourtalès-Gorgier.* One of these was a statuette of Hercules, 20 in. in height, attributed to the celebrated Italian sculptor, Giovanni da Bologna. The work may perhaps have been executed by the sculptor's father, also named Giovanni, who is said by Benvenuto Cellini to have been an ivory carver of repute.† This statuette brought the sum of 16,400 francs. Two other fine specimens, believed to have been carved by F. Flamand (François Duquesnoy), were a group of Venus and Cupid, said to have been left in pawn by the artist in the house in Livorno wherein he died, and a bas-relief frieze figuring the Triumph of Silenus; they were sold for 5,900 francs and 13,100 francs respectively.

Three of the finest examples of saddles decorated with ivory plates sculptured in relief are in the National Museum at Budapest, Hungary. One of them came from the treasury of the archiepiscopal Cathedral of Bucharest and another belonged to the Batthyany family in Kis Berum. They are

*"Catalogue des objets d'art . . . qui composent les collections de feu M. le Comte de Pourtalès-Gorgier," Paris, 1865.

†Christian Scherer, "Elfenbeinplastik seit der Renaissance," Leipzig, 1902, p. 8.



VIRGIN AND CHILD

FRANCO-FLEMISH ART, END OF THE XIV CENTURY OR BEGINNING OF THE XV CENTURY

$\frac{3}{4}$ DIAM.

MUSÉE DU LOUVRE



I. IVORY SADDLE-PIECE

SPANISH OR SICILIAN ART; END OF THE XIII CENTURY OR BEGINNING OF THE XIV CENTURY. ON THE SHIELD OF THE KNIGHT AT THE RIGHT ARE FIGURED THE ARMS OF ARAGON AND SICILY. MUSÉE DU LOUVRE

II. IVORY HARP, FRANCE

FLEMISH ART; END OF THE XIV CENTURY OR BEGINNING OF THE XV CENTURY. COMPOSED OF TWO PIECES OF IVORY. HEIGHT, 16½ INCHES; WIDTH, 9 INCHES. MUSÉE DU LOUVRE

all probably of fifteenth-century Italian workmanship, and in each of them appears the favourite design of St. George and the Dragon, accompanied by figures of lovers in gardens, and similar secular subjects, such as a group of musicians, a lady playing on a small organ, etc.*

From the hand of an Italian ivory carver of the end of the fourteenth or the beginning of the fifteenth century we have a coffret of hexagonal form decorated with classical subjects. The coffret proper rests on a base of marqueterie and coloured woods, mouldings of similar material surmounting it, tapering up in a pyramidal form to a six-sided button on which is a brass ring. The six compartments of the coffret present scenes from the story of Paris. As an infant, in the first, his mother Hecuba is about to put him to death to conjure the ruin of Troy predicted by the sybil Herophile, but Priam prevents her from doing so; then we have Paris exposed on Mount Ida by the shepherd Agalaus to whom he has been consigned. In his intentional abandonment here the luckless babe is nourished by a she-bear (third compartment) and finally Agalaus takes pity on him and adopts him. The fourth compartment figures Paris holding in his hands a crown awarded him by the shepherd for his courage and coldness; the fifth and sixth compartments figure the Judgment of Paris, to decide the dispute of Juno, Minerva, and Venus as to their respective merits.†

What is in the opinion of one of the best art critics in this department of art a work of superlative excellence is a triptych in the Louvre Collection, of Florentine workmanship and belonging to the last half of the fifteenth century.

*Julius von Schlosser, "Elfenbeinsattel des ausgehenden Mittelaltars," in *Jahrbuch der Kunsthistorischen Sammlungen des allerhöchsten Kaiserhauses*, Vol. XV, pp. 260 sqq., Wien 1894, figured in pp. 268, 269. They are also figured in F. Romer "Mitteilungen d. K. K. Central Commission," Vol. X, 1865, pp. 1 sqq., Figs. 5-7.

†Musée National du Louvre; "Catalogue des Ivoires," par Émile Molinier, Paris [1895-6], pp. 200-213.

It bears a representation of scenes from the New Testament, and also figures of St. Peter, St. Francis, St. Bernard, and St. Domenic, and in composition and execution is certainly a most impressive example of late Gothic art. The conjecture has been made that we have here a work in ivory by Benedetto da Majano (1442-1497), and there is a tradition to the effect that this triptych once belonged to Matthias Corvinus, king of Hungary, for whom Benedetto is known to have worked in other materials than ivory.*

A magnificent horn, or "oliphant," in the collection of Baron Adolphe de Rothschild, is pronounced by M. Molinier to be the most beautiful example of French ivory carving at the height of its excellence. It is also noteworthy as having brought not long ago what is believed to be the highest price ever paid for a specimen of such work up to the time it was disposed of, for it sold at the Fountain sale, in June, 1884, for £4,452, or about \$22,260.†

The well-known piece of ivory carving popularly, though erroneously, called *Le Couteau de Diane de Poitiers*, one of the gems of the Spitzer Collection, has often been ascribed to Jean Goujon, but there is little reason to believe that it is really his work, although the design may have been directly inspired, or at least suggested, by some of his sculptures.‡ In any case it is French work of the sixteenth century.

A fine ivory sculpture in the Royal Museum in Florence, representing the Descent from the Cross, is an excellent example of sixteenth-century art. The treatment is at once realistic, natural, and intensely dramatic, but those who are charmed by the devotional purity of Gothic art will miss

*Molinier, "Histoire générale des arts appliqués à l'industrie," Vol. I, "Ivoires," Paris, 1896, p. 212, Pl. xxi.

†Molinier, "Histoire générale des arts appliqués à l'industrie," Paris, 1896, Vol. I, "Ivoires," p. 218; Pl. xxiii.

‡Molinier, "Histoire générale des arts appliqués à l'industrie," Paris, 1896, Vol. I, "Ivoires," p. 218.

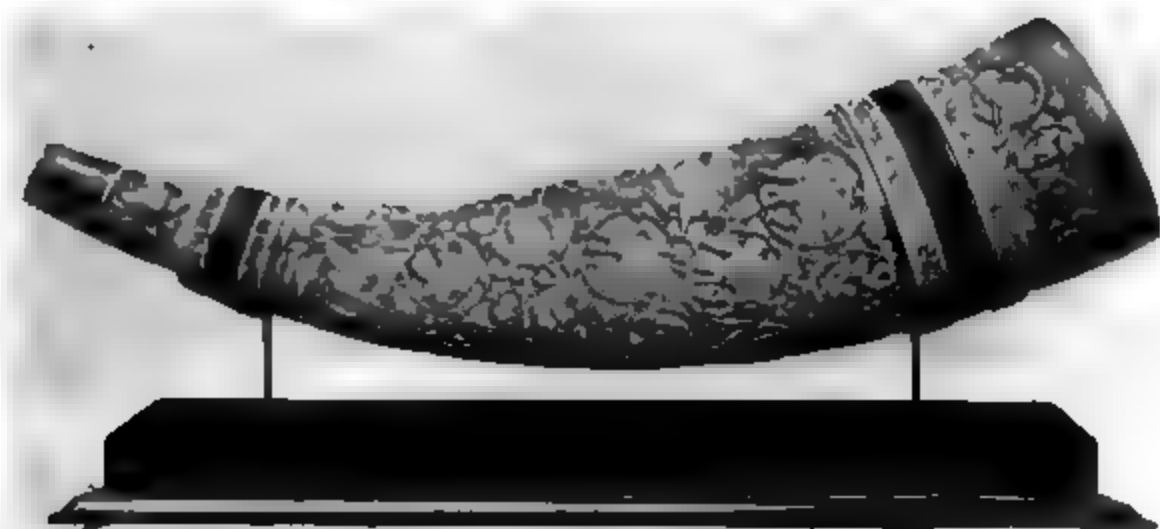


THE DEPOSITION FROM THE CROSS

SCULPTURE IN IVORY ATTRIBUTED TO MICHELANGELO (?)

$\frac{1}{2}$ DIAM.

REALE MUSEO NAZIONALE, FLORENCE



I. IVORY "OLIPHANT"

DECORATED WITH HUNTING DESIGNS. FRENCH ART OF THE XVII CENTURY
 ABOVE, AN "OLIPHANT" OF ORIENTAL WORKMANSHIP, WITH COPPER-GILT MOUNTING
 MUSÉE DE CLUNY, PARIS

II. IVORY "OLIPHANT"

DECORATED WITH ANIMALS AND BIRDS

SOLTYKOFF COLLECTION

III. IVORY "OLIPHANT"

WITH RELIGIOUS DECORATION. GERMAN ART OF THE XI CENTURY
 MUSÉE DE CLUNY, PARIS

something in this spirited production. A popular attribution to Michelangelo can at most be taken as a tribute to the superior artistic qualities of the work.

Besides the triptychs which were so much favoured, the principal productions of the medieval artists in ivory were boxes, usually for containing the relics of saints; panels for the decoration of chairs, doors, walls, etc.; croziers; tau-crosses, having the form of the Greek letter tau (T); pectoral crosses; crucifixes—very rare; paxes, for receiving the kiss of peace which was in earlier times exchanged between the communicants directly after the Mass; fan-handles; mirror frames; horns, both for hunting and drinking (they were also occasionally used as reliquaries); seals; chessmen; draughtsmen; cups and tankards, and portrait medallions.*

That ivory tablets were used well up to the end of medieval times in Europe comes out clearly in one of Chaucer's *Canterbury Tales* where he describes the friar's assistant as bearing about with him

A pair of tables all of ivory
And a poyntal polish'd fetishly.

These were for the registration of the gifts of those whose perhaps too sluggish charitable impulses had been struck by the alternate wheedling and bullying of the friar. If, however, the givers had any hope of gaining credit for their gifts, they were doomed to disappointment, for no sooner were they out of sight than the sharp end of the "poyntal" or stylet was exchanged for the blunt end, and the names of the givers were quickly rubbed off the surface of the tablet.

*See Dalton "Catalogue of the ivory carvings of the Christian era and carvings in bone in the Dept. of British and Medieval Archaeology and Ethnography in the British Museum," London, 1909, pp. 21, sqq.

The great treasure of the Luneburg Collection is the drinking-horn made of a fine elephant tusk in 1486. It has a rich setting and adornment of beautifully chased silver, and rests upon two supports figuring elephants bearing Gothic towers of relatively prodigious height upon their backs. The elaborately engraved cover of this drinking-horn is detachable and could be screwed on the point of the horn to prevent it from injury while the vessel was in use.*

The high prices now commanded by medieval ivories, and the very rapid increase in values within recent years, were strikingly illustrated at the sale of the J. E. Taylor Collection at Christie's in London in July, 1912. For example, a celebrated Milanese diptych of the fourteenth century, measuring 15 in. in height by 12 in. in width and carved with representations of scenes from the life of Christ, was sold for 3,500 guineas (\$17,500), although less than twenty years before, in 1893, it had only brought 380 guineas (\$1,900), thus showing an increase of over 900 per cent. in the interval. On this same day a small bit of French medieval work, also belonging to the fourteenth century, the ivory volute of a crozier, only $5\frac{1}{2}$ by $4\frac{1}{2}$ in. with the Virgin and Child carved on one side and the Crucifixion on the other, realized 1,150 guineas (\$5,750).

The fact that old ivories are valued at very high figures has naturally led to the perpetration of many forgeries, some of which are in themselves works of art, and indicate that the makers might honestly have earned a sufficient remuneration for their work. The following case serves as an illustration of this. A well-known Scotch connoisseur, while in Italy in 1904, was induced to purchase for £400 a beautiful ivory shield, which he was assured had been given to an ancestor of the Duke of Parma by one of the English Royal

*Handbücher der Königlichen Museen zu Berlin, Kunstgewerbe-Museum, Gold und Silber, by Julius Lessing, Berlin, 1892, p. 51, figured on p. 50.

family. When, later, expert examination revealed that the shield was a modern forgery, the collector, Mr. Craig-Brown, had recourse to legal action and succeeded in recovering the amount of the purchase money. Not long after this the same collector saw in Brussels, in one of the leading establishments for the sale of art objects, an exact copy, or replica, of the work he had rejected, the price being the same, £400. As an example of the value of medieval or Renaissance ivories, the "Vierge de Boubon," one of the rare figures of the Virgin of the type called by the French "Vierges Ouvertes," was sold at auction in 1903, as part of the collection of Sir Thomas Gibson-Carmichael, at Christie's in London, for the sum of £3,800, or about \$19,000.* This is by some experts believed to be the only genuine specimen of its kind.

One of these strange ivory statuettes named "Vierges Ouvertes" is listed in an inventory of the church treasure of Notre Dame de Paris, made in 1348. It is there described as "an ivory image of great antiquity, divided in the middle, and with sculptured images in the opening; it is generally placed on the high altar."† In this peculiar type of ivory the figure of the Virgin is longitudinally divided from top to bottom, so that the two halves can be opened out, forming two leaves of a triptych, the inner parts being carved with designs in harmony with those offered by the centre leaf, revealed when the figure is opened out.

The remarkably fine collection of ivories in the Grüne Gewölbe at Dresden was founded by Elector Augustus of Saxony (1553-1586), who was not only a great connoisseur but did some turning work in ivory himself. To gratify his

*Alfred Maskell "Ivory, in Commerce and in the Arts," Cantor Lectures; in *Journal of the Society of Arts*, Vol. LIV, No. 2817, p. 1178; November 16, 1906, and the same writer's "Ivories," London, 1905, p. 175, Pl. xx.

†Jules Labarte, "Histoire des arts industriels au Moyen Age et à l'époque de la Renaissance," Vol. I, Paris, 1864, p. 234; from *Comptes des ornements et meubles de l'Eglise de Paris*; MS. Arch. de l'Emp., L. 5093, fol. 22 recto.

ardent love for this art he caused two noted carvers to come to his court and remain permanently in his service. These were Egidius Lobenigk of Cologne and Georg Weckhardt, a Bavarian. Of the latter, the Grüne Gewölbe Collection possesses fifty works dated between 1581 and 1589, and of the former some forty specimens may be seen there. The sons of Weckhardt worked for Elector Johann Georg I, as did also another noted carver, Jacob Zeller. Hence much of the ivory material in the Grüne Gewölbe was, so to speak, produced on the spot, and undoubtedly in many, if not in most, cases, at the direct suggestion of the princely patron. An interesting exhibit here, from a historical point of view, is a small cup said to have been made by an imperial votary of the art of ivory carving, Emperor Leopold I of Germany.*

The ingenuity of a certain class of ivory carvers is exhibited effectively in a work shown in the National Museum of Florence. The carver, Filippo Planzone of Nicosia (flourished in the seventeenth century, until 1636), called *Il Siciliano*, has, by dint of painstaking effort, cut out from a single piece of ivory the figure of a horse enclosed in an outer network. The animal carving had to be done after the execution of the network and through its openings, so that the great difficulty of the task may well excuse any shortcomings in the equine figure, which, however, is better than might be expected.†

In the seventeenth and eighteenth centuries the art of ivory carving followed the prevailing tendencies in painting and sculpture. While technical skill showed no falling off, the higher ideals of art were generally lost sight of in a striving after originality and variety of design at the expense of true harmony. The four acknowledged masters of the period

*Julius and Albert Erbsstein, "Das Königliche Grüne Gewölbe zu Dresden," Dresden, 1884, pp. 11, 13.

†Christian Scherer, "Die Elfenbeinplastik seit der Renaissance," Leipzig [1902], p. 19.

were François Duquesnoy (1594–1644), surnamed in Italy *Il Fiammingo* or “The Fleming”; Gerhard van Opstal (1595–1668); Lucas Faid’herbe (1617–1697), a pupil of Rubens, and Francis van Bossuit (1635–1692). Of Faid’herbe only one work certainly from his hand is to be seen to-day. This is a relief in Prado Museum in Madrid depicting a group of children dancing to the flute-playing of a satyr. Here no one can fail to recognize in the chubby forms of the dancing children the influence of Rubens’ taste in painting. Many other ivories of Faid’herbe gained the applause of his contemporaries, such as a Christ on the Cross, a Venus, a Mercury, a Cupid and Psyche, an Adam and Eve, etc., these being executed under the direction of Rubens and in part at least from designs furnished by him, but no trace of any of these works can now be found. However, some art critics, as Christian Scherer,* for example, have more or less successfully identified as by Faid’herbe several ivories in various museums. One of the more effective, and one certainly quite in the manner of Rubens, is a tankard in the Grossherzoglicher Kammer in Carlsruhe, showing a wild bacchanalian dance of nymphs and satyrs in high relief.

The carvings of François Duquesnoy (*Il Fiammingo*), who was also celebrated for his representation of young children, are much more chaste in design and spirit, and are still influenced by the higher art of the fifteenth and sixteenth centuries. This excellence is not attained at any sacrifice of naturalness, as is well exemplified in a Cupid of the Green Vaults Collection in Dresden, not certainly by him, indeed, but confidently and probably correctly attributed to him.† This artist’s long residence in Italy and his enthusiastic study of the masterpieces of ancient art were undoubtedly main

*Christian Scherer, “Die Elfenbeinplastik seit der Renaissance,” Leipzig [1902], pp. 40, sqq., Figs. 32–36.

†See Scherer’s “Elfenbeinplastik,” p. 32, Fig. 24.

factors in the formation of his style. In his own time he received most credit for his productions in the field of religious art, but as none of these are now to be seen, we are unable to judge of their quality according to our standards of to-day; the most noted of these carvings was a crucifix given to Urban VIII, and looked upon as Il Fiammingo's masterpiece.

As an ivory carver, Gerhard van Opstal, a native of Antwerp, ranked in celebrity second to none of his contemporaries. The greater part of his life was spent in Paris, where he enjoyed the patronage of Louis XIV, who purchased a number of his works. His art was eminently naturalistic in the best sense, and while he was strongly influenced by Rubens, his compositions are as a rule conceived and executed in a much purer style than are those of his contemporary Faid'herbe. Several of his carvings in relief are in the collection of the Louvre and of the Musée Cluny in Paris. The essential purity of his art, even though he favoured the representation of bacchanalian scenes, is well shown in a little relief in the Musée Cluny, depicting a group of children—one a child satyr—playing with a goat.

Of the four leading Flemish exponents of the art of ivory carving in the seventeenth century, Francis van Bossuit was unquestionably the one least under the potent spell exercised by the great Rubens. In Bossuit's work, much more than in that of Duquesnoy even, we can trace the influence of classic art. Two fine examples of his art may be seen in the Herzogliches Museum in Brunswick; these are two reliefs, one showing an Apollo and Daphne and the other a Mercury and Psyche. They exhibit the successful blending of classic and Flemish art characteristic of the best of Bossuit's carvings. The influence of contemporary French art has also been noticed in his compositions, lending to them a certain harmony and poise, even though this be attained at the expense of a slight loss of originality and vigour.



I. HALF OF THE HANDLE OF A FLABELLUM

CAROLINGIAN (SOUTHERN FRANCE), XII CENTURY

II, III. DRAUGHTSMEN

FRENCH (?) AND NORTH EUROPEAN, XIII AND XIV CENTURIES

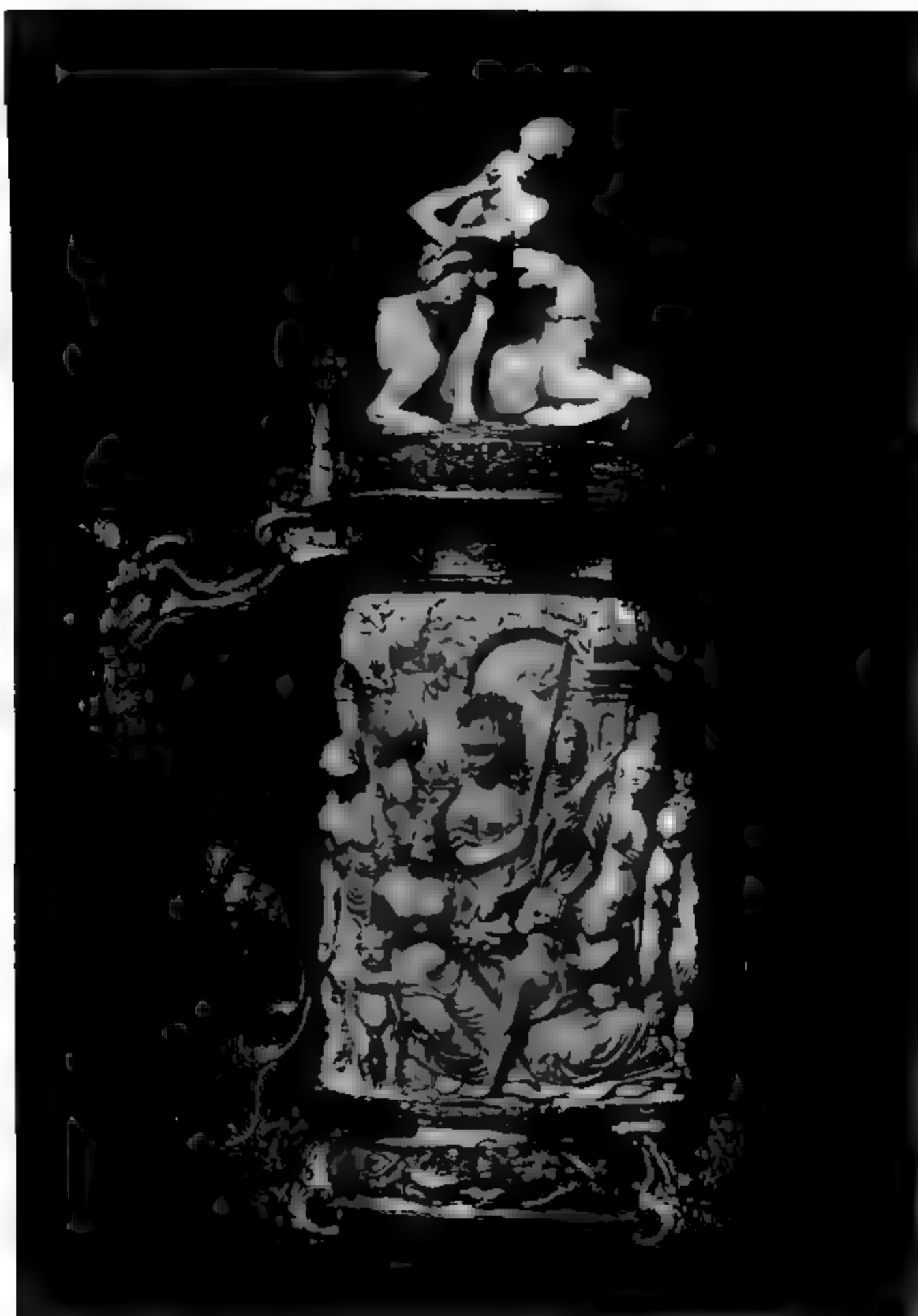
VICTORIA AND ALBERT MUSEUM

IV. CARVED IVORY BOX WITH SCREW LID

ON TOP MEDALLION CARVING OF ADAM AND EVE; AROUND THE BOX CLASSICAL SUBJECTS IN RELIEF. GERMAN, XVII CENTURY. EXACT SIZE. MUSEO DEL COLLEGIO ROMANO

V. SNUFF GRATER

CARVED WITH A GROUP OF MUSICIANS, AND WITH FRUITS, ETC. DUTCH, EARLY XVIII CENTURY. EXACT SIZE.



TANKARD AND COVER

CARVED IVORY, MOUNTED IN SILVER PARCEL-GILT; THE DRUM CARVED IN HIGH RELIEF WITH A BACCHANALIAN GROUP; ON THE COVER A GROUP OF A MAN SUBDUING A CENTAUR. AUGSBURG, LATE XVII CENTURY.

BRITISH MUSEUM

Ivory tankards adorned with representations in relief were much in favour with the German ivory carvers of the seventeenth and eighteenth centuries. The choice of this form was directly conditioned by that of the original material, for the larger, hollow end of the tusk required but little modification to shape it into the body of such a tankard. At the same time the cover, with its surmounting little statuette, gave the carver an opportunity to show what he could do in the way of modelling and executing a figure in the round.

A few examples of these tankards could be seen in the Morgan Collection in the Metropolitan Museum of Art, New York. Perhaps the best of these is one made by J. H. Mannlich of Augsburg, end of the seventeenth century. The body of this tankard shows a chain of child-figures in bas-relief, while the cover is surmounted by a deftly executed little statuette of the infant Bacchus.

The great vogue of ivory carving in the Netherlands during the seventeenth and following century has been attributed in part to the facilities enjoyed by this region in obtaining a plentiful supply of ivory because of the active commerce with the East of the Dutch traders. Another reason that has been alleged is that the influence of the School of Rubens, the "Fleshly School" *par excellence*, contributed to the favour accorded to the soft-toned ivory, so well adapted to render the more delicate hues of the human skin. Indeed, Rubens himself yielded to none in his admiration of ivory as a medium of artistic expression, and by his direct efforts fostered the special development of the art in the Low Countries very powerfully.

In the "Grüne Gewölbe" in Dresden is an elaborate specimen of ivory carving, more remarkable for the time and patience expended in its production than for its artistic quality. This is a group of no less than 142 figures, carved out of a single piece of ivory by a Neapolitan monk; the

subject is the Fall of the Angels. This ivory carving was donated to Augustus III, King of Poland, by his daughter Maria Amalia, wife of the King of Naples. A similar work, with fewer figures, however, is in the Bavarian National Museum at Munich.* The Dresden "Green Vaults" Collection comprises an exceptionally rich selection of carved and turned ivories, nearly five hundred in number, offering to the visitor a great variety of forms and illustrating the manifold formally artistic possibilities of this material, although the standard of true artistic excellence is not always of the highest in these productions of the seventeenth and eighteenth centuries.†

One of the "Trinity Rings" made by Stephen Zick, of Nuremberg, in the seventeenth century, is among those comprised in the Franks' bequest to the British Museum. It consists of three interlacing hoops turned from a single piece of ivory. Stephen Zick is said to have made but three of these rings.‡

In the church of St. James, Spanish Place, London, may be seen a very striking ivory crucifix, presumably the work of a Spanish carver, and offering a singularly realistic treatment of the subject. The most painful details are here mercilessly accentuated, so as to arouse in the highest degree the pity of the beholder for the Divine Sufferer. Not only the wounds inflicted during the crucifixion itself, but the marks of the scourging which preceded it, are rendered with fearful realism. A singular detail in the execution is that the blood streams from the wounds are formed of minute rubies set close together.**

*Christian Scherer, "Die Elfenbeinplastik seit der Renaissance," Leipsic [1902], p. 13 (Fig. 7).

†See "Guide to the Royal Green Vaults at Dresden," Dresden, 1889, pp. 14-22.

‡C. M. Dalton, Catalogue of the Finger Rings bequeathed to Sir Augustus Wollaston Franks', London, 1912 (No. 1727).

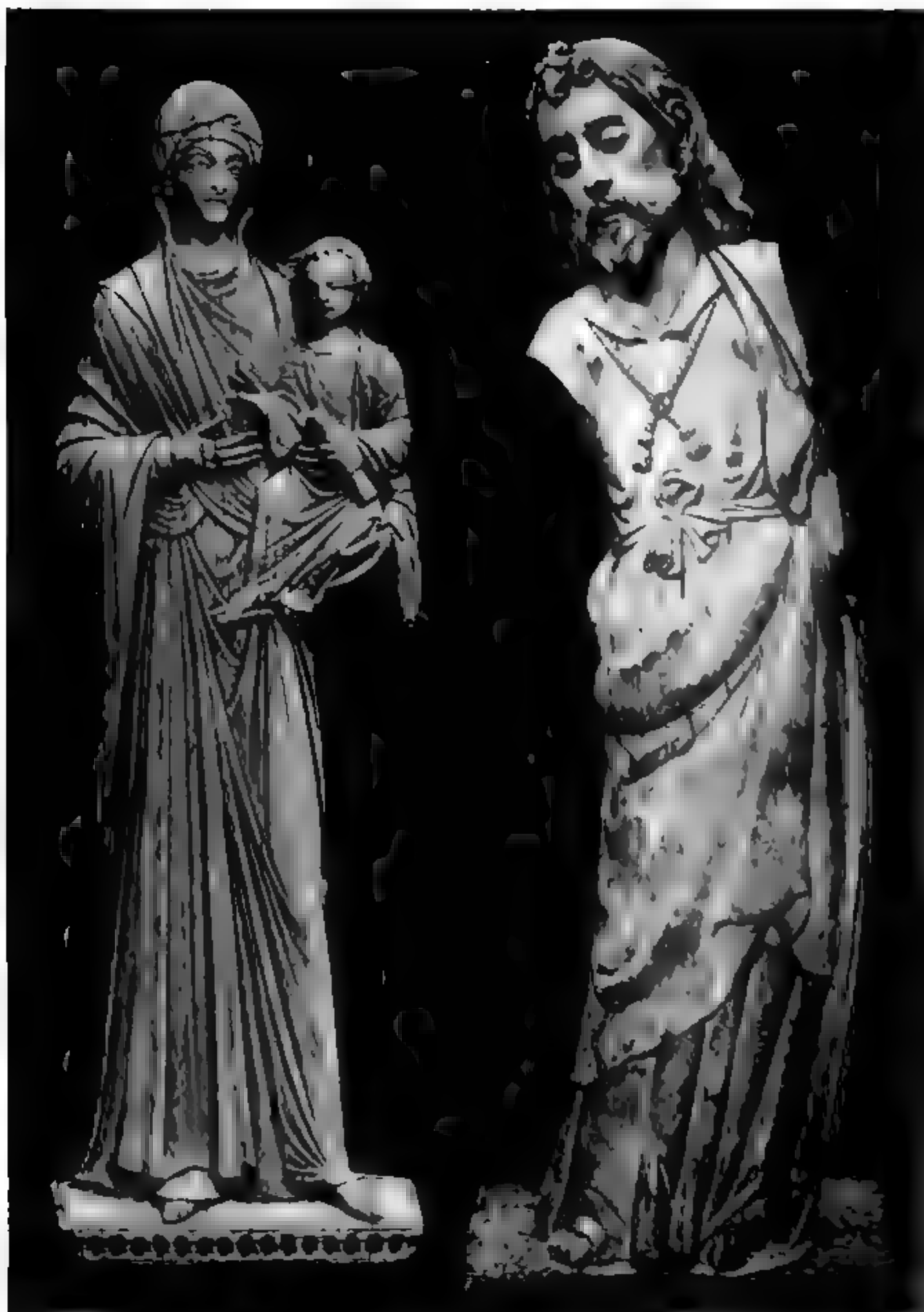
**Maskell, "Ivories," The Connoisseur's Library, London, 1905, p. 264.

The ivory carvers of Dieppe in France long enjoyed an altogether special reputation. During the seventeenth and most of the eighteenth centuries the art was cultivated here with pronounced success, its practice being in many cases handed down from father to son, but the prosperity of the ivory carvers gradually declined toward the close of the eighteenth century. The financial distress immediately preceding the French Revolution, and the disturbance of all industrial enterprises caused by that terrible political upheaval, had much to do with this; added causes are alleged to have been the production of so many beautiful objects in porcelain, and the introduction into France of the quaint Chinese ivories, which caught the popular fancy and were preferred to the formal and traditional art of the Dieppe carvers. Indeed it must be confessed that the art here had become too mechanical, a mere copying and reproducing of the older models, which when first produced could lay claim to no small share of originality. By the early part of the nineteenth century the lowest point had been reached, and the few ivory carvers who still exercised their art in Dieppe found it difficult to dispose of their product. Now, however, a change occurred, English tourists began to frequent the country, and what had lost its charm for the French appears to have appealed to their taste; they bought freely and paid well. This revival was quite rapid, so that by 1832 much of the lost ground had been recovered. At this time the three best ivory carvers, who had their establishments in the Grand 'Rue of the city, were MM. Bland, Flammand, and Thomas. Among other quaint forms of carving practised here at this time were the magic balls, so favoured by the Chinese, as many as twelve, one within the other, and entirely separated from each other, being carved out of a single sphere of ivory.*

*Vitel, "Histoire de Dieppe," Paris, 1844, pp. 341-343.

The "Exposition Rétrospective," one of the most attractive features of the great Paris Exposition of 1900,* contained a number of choice examples of ivory carving, the exhibits being loaned by various institutions, churches, and individual collectors. Among the examples of Roman-Greek carving was the diptych of Justinianus (sixth century) later acquired by Mr. J. Pierpont Morgan; several other good specimens of this and the immediately succeeding periods served to illustrate the gradual falling off in artistic excellence. A curious book cover from the tenth century, known as the *Evangélaire de Morienvall*, from the church of Notre Dame de Noyon, offered a good example of the medieval ivory carving of Western Europe under Byzantine influence. Very naturally, the best ivories in this exhibition were of those worked in the thirteenth, fourteenth, and fifteenth centuries by the great ivory carvers of the French Renaissance School. Here the aim was to select a number of thoroughly characteristic specimens, avoiding, as far as possible, the monotony that might result from grouping together a large number of examples of certain types of the Virgin and Child which became more or less conventional in some of the Renaissance workshops. It is interesting to note in this connection that the best of the statuettes should be thirteenth-century work, the Angel Gabriel and the Virgin of the Annunciation, loaned, respectively, by M. G. Chalandon and M. P. Garnier. Here the restrained dignity of the pose, the classic harmony of the drapery, the earnestness and beauty of the faces, show us the pure art of the Early Renaissance at its best. From the fourteenth century is one excellent example, a seated figure of the Virgin bearing the Divine Child on her lap, an exceedingly well-balanced composition,

*See Exposition Universelle de 1900, Catalogue officiel de l'exposition rétrospective de l'art français.



I. THE VIRGIN AND CHILD

RELIEF IN IVORY, THE BACKGROUND CUT AWAY. BYZANTINE, X OR XI CENTURY
COLLECTION OF J. PIERPONT MORGAN

II. STATUETTE OF A SAINT

SPANISH ART OF THE XV CENTURY. HEIGHT 19 INCHES
MUSÉE DE CLUNY, PARIS



SIX IVORY CHESSMEN
MEDIEVAL ART

BIBLIOTHÈQUE NATIONALE

showing both strength and beauty of design; this was from the Musée des Antiquités de la Seine-Inférieure. A remarkable diptych (fourteenth-century work, loaned by M. Boy) shows six bold, strongly marked reliefs embodying designs from New Testament history, the Entry into Jerusalem, the Washing of Feet, the Scene in the Garden of Gethsemane, the Last Supper, the Gift of Tongues, and the Ascension; in the last-named scene, because of the exiguity of the available space, the artist is able to show only the lower part of the garment of the ascending Christ, giving somewhat the effect of a figure disappearing in the flies of a theatre. From the fifteenth century perhaps the most important piece was an Annunciation from the Musée de Langres, the two figures of the Virgin and the Angel Gabriel (kneeling) being sculptured in the round and placed on a base. While the attitudes are animated and the composition effective in its way, it somehow fails to impress us as do the best of the Early Renaissance figures; the straining after effect is a little too apparent in spite of the unquestionable technical excellence of the work.

The very fact that the ivory carver's task is rendered more difficult by the strictly limited size of the mass or surface at his command forced him to intensify the quality of his design, and to tax his ingenuity to the utmost in his effort to portray his theme effectively within such narrow limits; indeed, he had to contend with much the same difficulties as those confronting the medallist. In statuettes the obligation to adapt the pose of the figure to the curve of the tusk led to certain peculiar and constrained attitudes, and it is an exceedingly curious circumstance that we can trace in some of the stone sculpture of the heyday of ivory carving a strong tendency to copy this slight distortion or twist of the figure although the stone sculptor had no excuse for so doing. This peculiarity can be accounted

for only by the strong influence exerted by the observation and study of ivory carvings at a time when any plastic artist must have found pleasure, instruction, and inspiration in contemplating them.*

The origin of that branch of decorative art known to the French as *ébénisterie* is to be sought in the adornment of pieces of furniture or caskets by the insertion of plates of ivory. This was much favoured in the seventeenth century, ebony being the wood most prized for the framework of the furniture or casket. Later on tin was employed in this way, then tortoise shell, and finally woods of various colours were given the preference. The somewhat funereal air of this work in ebony and ivory is said to have led to its disuse. To this may be added the costliness of the material and the difficulty experienced in working it for this purpose. It could not be chiselled into form, but had to be first sawed out and then sculptured by the aid of the graver—a long and delicate operation.†

The adornment of articles of furniture with ivory inlays has been practised from the most ancient times, an old Assyrian text attesting this usage among the Assyrians. In modern times we have still many excellent examples of this art, one of the finest being a cabinet produced by the Fratelli Stannard, Galleria Colonna, Rome, with an elaborate ornamentation of ivory plaques, most beautifully designed and executed.

The German schools of ivory carving at Geislingen and Erbach are of much more recent origin than that of Dieppe in France; indeed, it was not until well into the eighteenth century that ivory was freely used here, the earlier work

*Communicated by Mr. Charles de Kay, in an article about to appear in the *Century Magazine*.

†Henry Havard, "Dictionnaire de l'ameublement," Vol. III, Paris, n. d., cols. 65, 66. Article Ivoire.



I, II. RELIEFS IN IVORY

XV CENTURY WORK

III. LEAF OF A DIPTYCH SHOWING THE CRUCIFIXION

XV CENTURY

IV. LEAF OF A DIPTYCH, DEPICTING THE CRUCIFIXION AND ENTOMBMENT OF CHRIST

EXAMPLES OF XV CENTURY FRENCH ART

MUSÉE DE CLUNY, PARIS



CONTEMPORANEOUS RUSSIAN IVORY CARVINGS

I. EMPRESS CATHERINE II

II. PRINCE PAUL PETROVITCH

III. PRINCESS MARIA FEODOROVNA

being principally, and often exclusively, of bone. The activity in these schools has been mainly industrial, comparatively little art work pure and simple having been produced, and the prosperity of the workshops has been dependent upon the temporary vogue enjoyed by small decorative objects, such as brooches, etc. Nevertheless, many of the carvers could lay claim to the possession of a very considerable share of technical skill, and here and there a real artist has appeared among them.*

As a specimen of Russian work we have three striking profile portraits, executed in the reign of Catherine II of Russia (1729–1796), one giving a fine likeness of the empress herself, and the other two depicting her son Paul Petrovitch (later Paul I) and the Princess Maria Feodorovna. These profile busts are cut out of ivory plates, a circular band of the material being left to serve as a frame. In this form they could be mounted on hard wood, metal, or velvet; the velvet serving as an excellent background for the ivory portraits.

The modern revival of the art of ivory carving in France and Belgium owes much to the initiative of the great French painter and sculptor Gérôme, who, in order to widen the artistic field and appeal to a larger class of art patrons, founded the “Société de l’art précieux,” to foster the production of small works, which would have better chances of finding their way into a great number of private collections than could the large figures in marble or bronze.† Ivory as a material was peculiarly favourable to subserve these purposes, and lent itself well to a combination with gold, silver, or other metal, this combination greatly enhancing the charm of the work of art.

*Somborn, “Die Elfenbein und Beinschnitzerei,” Heidelberg, 1899.

†Émile Ducier, “À propos de l’ exposition du Musée Galliéra”; in *La Revue de l’Art*, Vol. XIV, pp. 61-74; 1903.

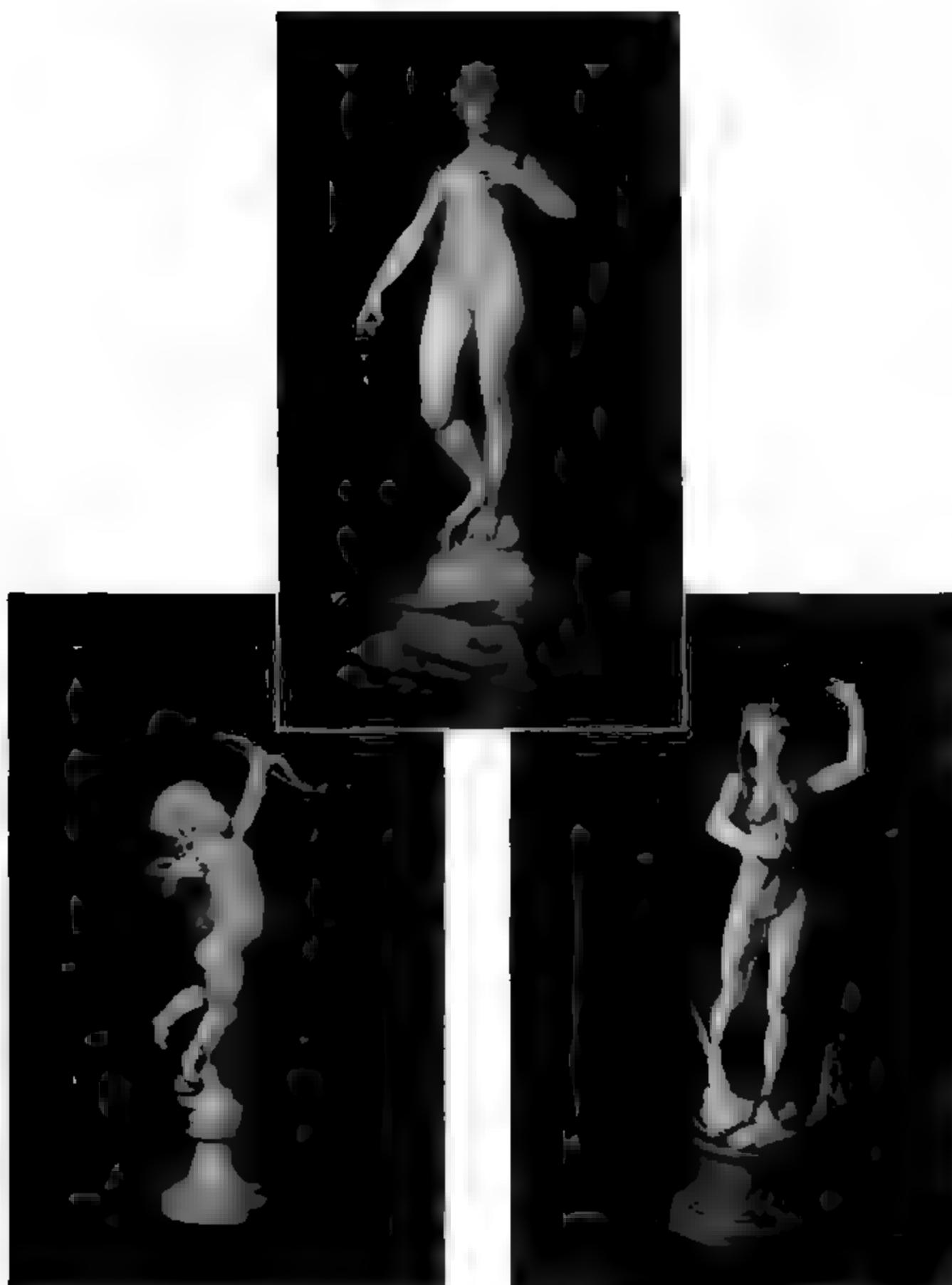
The ivory carvings of the late Moreau-Vauthier, many of which are in this country, may be regarded as representing the height of this art as practised in our day. Although a number of artists have done very praiseworthy work in this department within the past half-century or so, Moreau-Vauthier had at once so much originality, such a thorough understanding of the potentialities of his material, and such an appreciation of the best traditions of the art of ivory carving, that his works may be said to stand in a class by themselves.

At an exposition of art for children recently held in the Museum of Modern Art, in the Rue Pierre Charron, Paris, some very pretty ivory trinkets were displayed. One of these was an ivory ring bearing a row of little silver bells with forms of angels in repoussé work, most appropriate to childhood, as this age is more especially that during which the Guardian Angel's care is most needed and merited. Some pretty little ivory napkin rings with a pierced silver band were also shown in this exhibition.

A fine collection of Congo ivory work is contained in the Musée du Congo, or Musée de Tervueren, as it is sometimes called, situated in a suburb of Brussels. It is built upon the site of the royal Château of Tervueren which was destroyed by fire some years ago. At the time of the Brussels Exposition of 1897 a small building was erected on this site to contain exhibits illustrating the Congo region, and in 1904 the present imposing structure was begun and it was finally completed and opened to the public in 1909. During the first three and a half months after the opening it was visited by 182,500 persons, including 16,000 school children under the guidance of their teachers. The revival of chryselephantine sculpture, that blending of gold and ivory to which some of the grandest works of Greek art owed much of their beauty, is attributed to the abundant supply of ivory derived from



"THE FLORENTINE BOY"
BY THE LATE A. MOREAU-VAUTHIER



IVORY STATUETTES

I. "ALLÉGRESSE" (JOY), BY DILLENS

II. "L'AMOUR" (LOVE), BY ROMBAUD

III. "LA HAINE" (HATE), BY GELEYN

BELGIAN SCULPTORS—TWENTIETH CENTURY

the Congo region in recent years, and this and other ivory work has received notable encouragement from the Belgian Government. Realizing that the high price of ivory was an insurmountable obstacle for many poor artists the Government agreed to furnish them the material at cost price and also to give them credit for four years, so that they could be practically assured that they would have received the price of their art works before they would be called on to pay for the material.*

Among the products of Belgian art, one of the finest is the "Sphinx" of Christian van der Stappen, first exhibited in the International Exhibition at Antwerp in 1894, where a large number of excellent ivory carvings were shown, notably by Belgian artists, the revival of the art in Belgium being principally due to the liberal action of the Government, under the personal influence of King Leopold II, in facilitating the task of the carvers by placing at their disposal a considerable quantity of Congo ivory. Van der Stappen's "Sphinx" is also one of the most successful efforts to revive and realize the ancient Greek chryselephantine sculpture, the effect of the ivory being most skilfully and artistically enhanced by the gold and silver employed in the helmet and cuirass of the bust. At the same time the mysterious element is powerfully brought out in the intent expression of the face, marked with that deep-seated melancholy inseparable from a knowledge of the enigma of the universe, the great "world riddle."

Owing to the importance of the modern Belgian School of ivory carving, the following fairly complete list of the more noteworthy works by Belgian artists is here given. It will be seen that almost all the various forms of ivory carving are represented among the productions.

*Baron A. de Haulleville "Le Musée du Congo Belge à Tervueren"; in "La Revue Congolaise," 1^{re} Année, No. 2, pp. 208-225; 1910.

78 I V O R Y A N D T H E E L E P H A N T

HUYGELEN, FRANS, Born in Antwerp, August 19, 1878.

Works: "Femme aux masques;"
Vase: "Jeunesse";
Portrait of Mlle. A.;
Coupe à fruits "l'Abondance";
"l'Idole";
Vase: "Printemps."

MATTON, ARSÈNE, Born at Harlebek, Belgium, December 15, 1873.

Works: "Le Silence," seal in ivory and silver;
"Souhait de Roi," medallion;
"La Rosée," figure;
"Jeu d'enfants," group;
"Heureux retour," group;
"Mokoko," head of a negro child.

VINCOTTE, THOMAS, Born January 8, 1850.

Works: Life-size bust of H. M. Leopold II;
Bust, three quarters natural size, of Mme. E.;
"Méduse," bust;
Medallion of Princesse de L.

DE CUYPER, FLORIS, Born at Antwerp, August 7, 1875.

Works: Annexation of the Congo to Belgium, ivory medallion,
obverse and reverse;
"Le Glaneur," statuette;
"Début de modèle," statuette.

ROUSSEAU, VICTOR, Professor in the Académie Royale des Beaux-Arts de Belgique.

Works: Portrait of Mme. R., bas-relief;
Hand of a young man;
"Rêverie," male figure;
"Ravi," figure of an adolescent;
"Le Baiser," group;
"Tête de jeune fille";
Album cover; combination of bas-reliefs in ivory, with
gold ornamentation, and set with precious stones.

VANDEVOORDE, G., Born at Courtrai, April 28, 1878.

Works: "La Tourmente";
 "l'Adolescent," male figure seated.
 "l'Ingénue," figure of a young girl.

HÉRAIN, JEAN, Born in Louvain, October 24, 1853.

Works: "La Captive";
 "Hédéra";
 "l'Agriculture," ivory and silver;
 "La Maternité," ivory and silvered bronze;
 "Bruxelles port de mer."

DEVREESE, GODEFROID, The Commemorative Medallist of the
 American Numismatic Society, New York, born at
 Courtrai, August 19, 1861.

Works: "Désespoir," statuette;
 "Chrysis," statuette;
 "Thais," statuette;
 "La Vierge," statuette;
 "Danseuse à la guirlande," draped statuette;
 "Danseuse," nude figure, statuette;
 "H. M. Leopold II," with a reverse, plaque;
 "Their Majesties Albert and Elizabeth," with reverse
 plaque;
 "Portrait of the artist's wife," plaque;
 "Mlle Aline D. S.," plaque;
 "M. A. M.," plaque with reverse;
 "M. E. A.," medal.
 "M. F. D. S.," plaque;
 "M. le Député P. T.," medal;
 "Salomé," plaque;
 Medal (as pendant) of Mlle. B.;
 Medal (as pendant) of the artist's wife;
 Medal (as pendant) of Mlle. Y. P.;
 "Mlle. De W.," pendant.

80 I V O R Y A N D T H E E L E P H A N T

SAMUEL, CHARLES, Born in Brussels, December 29, 1862.

Works: "Ulenspiegel et Nele," small group;
"La Fortune," statuette in ivory and silver gilt; 2 ex-
amples;
"Les Lis," statuette;
"Crépuscule," statuette in ivory and silver gilt;
"Nélé," bust in ivory and wood from the Congo;
"Candeur," statuette;
"Aurore," statuette;
"Jeune flamande," bust in ivory and wood from the Congo
"Coquetterie," statuette;
"Ève," vase, ivory and bronze;
"Inspiration," statuette, ivory and onyx;
"La Coiffure," statuette;
"Phryné," statuette;
"Joueuse de flûtes," statuette;
"Jeune fille à la guirlande," statuette;
"La Danse," small group;
"Her Royal Highness the Countess of Flanders," medal;
"Jean Rouffart," medal;
"Jean Pierre et Marcel Pérez," medal;
"Saby Halot," medal;
"Saby Janssen," medal.

DE BREMAECKER, EUGÈNE, Born July 14, 1879.

Works: "L'Eternel Féminin";
"Vers la Civilisation."

VAN HOVE, G., Born in 1861; Prix de Rome of 1888.

Works: "St. Michael," wood and ivory;
"La veux-tu," ivory and bronze;
"Elégante," statuette;
Seal, portrait;
Book cover for Livre d'Heures;
"Confidence," group;
Head of a man, pummel of a cane;
"Saint Barbara."

82 I V O R Y A N D T H E E L E P H A N T

DE BEULE, AL., Born at Zele, August 27, 1861.

Works: Saint Michael and the Dragon;
"Madone," statuette.

WEYNS, J., Born at Merxem (Antwerp), March 17, 1849.

Works: Homage to King Leopold II;
"Charmeuse au serpent";
"Abandonnée";
"l'Oiseleur";
"Joueur de flûte";
"Mercurius," statuette;
"Warrior," bust in old silver, face in ivory;
"Jeanne d'Arc," statuette;
"Mme. Van W., " portrait;
"M. E. C.," medallion;
Child's head (Mlle. L.);
Saint Hubert;
Saint Cecilia; ivory and silver;
"Avant le bal," bust;
Various bas-reliefs.

WOLFERS, Born at Brussels, April 16, 1858.

Works: Iris and lizards, vase;
Poppies, vase;
Iris and fish, vase;
Swan and dragon, vase;
"Le Chant du Cygne," vase;
Swan and snake, vase;
"L'Exposition Coloniale de Tervueren," album;
"La Parure," coffret a bijoux;
"Junon," lamp;
"Le Premier bijou" (Femme à la perle);
"Méduse," pendant;
"Le Paon," éventail;
"Ève," statuette;
"Printemps," statuette;
"Rêverie," statuette;
"Offrande," statuette;
"Maleficia," bust in marble and ivory;
Various portraits (bas-reliefs).

DUPON, JOSUÉ, Born at Western Flanders (Belgium), May 22, 1864.

Works: "Diane," statuette;
 "La Perle," statuette;
 "Belluaire," statuette;
 "Sainte Vierge," statuette;
 "Toilette," statuette;
 Van Berchen, statuette;
 "Phryné," statuette;
 "Saint John," bust;
 "Judith," bust;
 Portrait of M. S., plaque;
 Portrait of M. B., plaque;
 Portrait of Mlle. B., plaque.

The following figures show the quantity of ivory placed at the disposal of artists wishing to execute chryselephantine work by the Government of the Belgian Congo in 1912 and 1913:

Number of tusks delivered	. . . . .	9
Weight in kilograms	. . . . .	467.9
Quantity returned (kilograms)	. . . . .	287.3
Quantity used (kilograms)	. . . . .	180.

Ivory amulets, though not usual, are sometimes to be found, even in our own day, one having been picked up in Madrid not long since by Mr. W. L. Hildburgh, who has made a special study of Spanish amulets. The form given the ivory, which is painted red, and set in a silver locket, is that of the so-called "fig-hand," so common in Roman times and still a favourite form among the Italians. Its primal significance is rather unsavoury, but in later use (and probably to a great extent with the Romans also) its virtue is that of a protection against the Evil Eye. In its origin this hand is a female emblem, while the horn is a masculine one. Another "hand-amulet" used against the Evil Eye and

84 I V O R Y A N D T H E E L E P H A N T

other enchantments by the Arabs is known in North Africa as the Hand of Fatima; this, however, is an open hand, and probably enough has no connection with the curious "fig-hand."*

There is in the National Museum of the Society of Antiquaries of Scotland (No. 183 in Section L) an ivory amulet which at one time enjoyed high repute in Argyleshire as a cure for madness. This was a plate measuring $7\frac{1}{2}$ in. in length and about 4 in. in width.†

An ivory amulet, figuring a small dog, is said to be worn on a bracelet by Queen Mary of England, and to be valued by her as a luck-bringing talisman, or to ward off evil. As we have seen, the ancient Egyptians already had their ivory amulets, so that in addition to its value as a most delicately beautiful material for ornamental work, ivory is not lacking in the possession of more occult virtues, if ancient tradition and modern fancy are to be trusted. To this ivory dog of Queen Mary may be added, if gossip is to be believed, an auto-amulet, or mascot, favoured by King George V. This is a small bronze figure of Britannia, whose hands bear a royal or imperial crown; a lion is crouching at her feet. This symbol of sovereignty is certainly not an unworthy type of amulet for a British monarch.‡

What may be regarded as a work testifying to the possession of a remarkable natural endowment by the artist is entitled "The Procession of Elephants" and was cut out of a solid piece of ivory by an American, a travelling salesman for a wholesale shoe manufacturer. Suffering from jaded nerves he took up ivory carving as a relief. He did not enjoy the advantage of an instructor's teaching, but by means

*See. W. L. Hildburgh, "Further Notes on Spanish Amulets," in *Folk Lore*, Vol. XXIV No. 1, March 31, 1913, p. 65.

†William Jones, "Credulities Past and Present," London, 1880, p. 161.

‡From the *Jewellers' Circular Weekly*, February 5, 1913, p. 153.

of close application and a thorough study of the elephant, he nevertheless succeeded in producing some of the best and most lifelike carvings of the animal that have ever been executed. A striking merit in his work is its high degree of originality, for no two elephant figures from his hand are alike. His work is limited in quantity as he has in all executed but six groups, for while his ivory carving proved an artistic success, it failed as a curative agent for nervous ills, the close application causing insomnia and obliging an abandonment of the very promising career. †

These carvings are especially interesting as they are cut out of a full section of a perfect tusk, which the slightest imperfection or the least error would have spoiled, and they are more realistic and unstrained in action than any Japanese groups.

The adoption, in the eighteenth century, of ivory as the favourite, indeed almost the exclusive material for miniature painting, did much to render the miniatures of this century the beautiful works of art they are. So soft and smooth are the tones of the best material that as great a master in this art as Cosway frequently left parts of his figures entirely uncovered by the brush, depending altogether upon the delicate tones of the ivory to represent the hue of the skin.*

Indeed, for miniature painting ivory is preëminently adapted, the colours applied to its smooth surface blending softly and tenderly. This quality was fully appreciated by the masters of the art of miniature painting such as the Englishman Richard Cosway (1742–1821) and John Smart (1741–1811) and the Frenchmen Augustin (1729–1832) and Isabey (1767–1855), as well as by our own Malbone (1777–1807) and Baer, only to mention a very few of those who have cultivated this art.

*George C. Williamson, "How to Identify Portrait Miniatures," London, 1906, p. 37.

Another use, and one that has endured for many centuries, is the employment of ivory for fan sticks, either plain or more often delicately carved. The most notable relic of this kind is a fan of purple vellum with ivory sticks, the gift of Queen Theodolinda to the Cathedral of Monza, and still preserved there as one of the chief treasures.

It may be interesting to note that the set of turquoise belonging to another queen, the unhappy Marie Antoinette, and sold with the other French crown jewels in 1888, proved to be not true turquoise but the mineral known as odontolite, or fossil ivory, naturally stained by iron phosphate.

The following practical directions as to the protection of ivory paintings, so that they may long preserve the delicate beauty they exhibit when fresh from the artist's hand, have been kindly supplied by one of our most gifted miniaturists:

The back of an ivory miniature painting should be kept as it comes from the ivory merchant—that is, nothing should be fastened, gummed, or glued to its back. Any white or cream-coloured paper, and free from arsenic, is then placed loosely against it. Whatinan's hot-pressed, or steinbach papers are entirely safe. In setting an ivory plaque into its frame or bezel, it is advisable to insert a narrow rim of flat metal to keep it from being pressed against the glass. This rim or mat has the special advantage of hiding the outer edge of the ivory where it is cut narrower than the frame or bezel containing it. Ivory, like wood, expands and contracts laterally, making it necessary to cut all ivory paintings perhaps three per cent. narrower, laterally, than the frame may be; unless this is done, a close-fitting ivory will surely buckle, in time. The cutting of ivory less than the thickness of two ordinary visiting cards can be done with any ordinary scissors. This cutting must be done with the grain, and in narrow bits which readily split away or crumble. Moreover, all cutting must be from side centres up-

ward, and inverting the ivory to cut the sides of the lower half of any oval. No cutting across the grain should be attempted by an inexperienced person.*

Having the ivory set into the frame, a proper backing becomes necessary to hold it in its place. For this a piece of aluminum cut to fit the frame is the most serviceable of light metals. By laying a piece of very thin paper, larger than the frame, across the back, and pressing the aluminum back-plate into the bezel, a firm hold is assured. Square or oblong ivories are best secured by dispensing with the mat, placing a sheet of good quality mica behind the paper backing and sealing the edges with gold-beater's skin (so-called "skin-plaster"). The use of photographer's slide binder is also entirely safe. The sealing should be perfect, to prevent the imperceptible moisture of damp weather finding its way under the glass. Experience has shown us that while an ivory will not deteriorate on account of moisture, the inside of the glass covering will in time show foggiess, though not in so great a degree as do daguerreotypes, where the glass and the metal are more active in collecting a chemical deposit under the glass.

CARE OF PAINTINGS ON IVORY

The above final remarks remind us that an ivory painting should not be exposed to sudden changes of temperature. A cold piece of glass will immediately attract and condense any latent moisture. It will draw it in under the framing and will hold this moisture for many days. Sunlight would bleach most colours more or less, no matter what make and whether they be oil colours or pastels, let alone water-colours of delicate, pellucid gradation, with practically no body strength. Miniatures kept in the ordinary light of our homes will last indefinitely. There is nothing in their

*All thick ivory is best cut with a jeweller's saw.

colouring to vitiate or decompose and, in consequence, miniatures that have had good care are as fresh in their pristine colouring as when painted two hundred years ago. Lest we overlook an obvious point, miniatures on ivory are all painted in water-colours—they will wash off readily. Should there be an old miniature in your possession that looks soiled, it may be cleaned with a soft and gritless rubber. Most commercial rubbers are charged with pumice or other cutting powder. There is no cleaner quite so wonderful for all general purposes as pure rubber that is some five or more years old; any expert will verify this. Biting into a rubber is the test for pumice. The so-called ink erasers are heavily filled with grit. A new rubber called “art gum” is now obtainable at all art material dealers, and is an excellent soft eraser and cleaner.

The largest ivory of longitudinal diametrical cut the writer has seen is $5\frac{1}{2}$ by 13 in. oblong.* Larger cuttings have been made by cylindrical cutting—such ivory flattened never loses its tendency to regain its original shape, and in consequence can only be used when mounted solidly with moisture-proof glue or cement.

MINIATURE PAINTING AS AN ART

There is no secret or trick in the art of miniature painting. Most of our ablest painters have acquired their art unaided apart from their previous study of drawing and painting. The work requires good eyesight, and in advanced years one requires both spectacles and magnifying glasses. However, it is not a matter of art to paint small miniatures, nor is it a recommendation to paint detail for its own sake. A highly elaborated miniature may be devoid of art or it may be a masterpiece. Excepting Holbein, there is no miniature painter that has mastered detail without losing charm to

*One half of it was used in his “Arcadia,” by W. J. Baer.

some extent. Charm may lie in the exquisite fitness or the balance of parts to the whole. In our own country, Edward Greene Malbone, not only excelled his contemporaries at eighteen, but in his short life painted many miniatures that are superior to almost all others, barring a few masterpieces by English, German, and French miniaturists.

A highly gifted modern American miniaturist was the late Miss Theodora Thayer, of Cambridge, Massachusetts (died 1903). Her portrait of "Miss Gray" in the Metropolitan Museum of Art, New York City, is distinctly the work of a true artist. The absence of all useless detail would have earned the applause of Holbein, who might have said of the work: "It is complete, it is charming without sentimentality, it is true expression."

One of our great collectors had a number of miniatures by Malbone, Cosway, and other great miniaturists, all of which had warped, rendering the surface uneven in parts. They were handed to a skilful repairer, who asked for a sufficient length of time in which to perform the repairing. By a timely and skilful application of moisture at the proper places he was able to restore the entire collection—some fifty pieces in all—without breaking a single one. It is most important that in mounting a miniature the glass that is to cover it should be placed on the face of the ivory. First, a piece of thin blotter or paper must be placed on the back of the miniature, the edges being concealed by swan-skin or some thin "onion-skin." This being done, all moisture is removed, and the miniature is placed where it will be subjected to no changes of temperature.

"Buckles" or "spots," as they are termed, are apt to develop on imperfectly or unevenly cut pieces of ivory. The ivory miniaturists find that by placing a bit of damp blotter under the miniature, and laying a piece of blotter on the upper side, and upon this successive plates of glass, one half

inch or so apart, until a pile several inches in height has been made, and then upon this a pile of books, at the end of twenty-four hours a spot can be removed, but the miniature must remain under this pressure for days, until the moisture has all evaporated, or it will buckle.

A most interesting memorial of early American ivory carving is a card engraved by Paul Revere (1735–1818), the patriotic silversmith and engraver, for a certain Isaac Greenwood of Boston, the text of which reads as follows*:

Isaac Greenwood, Ivory Turner. Next to Dr. John Clark's at the North end, Boston. Turns all sorts of work in ivory, silver, and brass with fidelity and despatch at a very reasonable rate. Makes umber.

As a beautiful and artistic decoration for book-covers, nothing surpasses carved ivory, with its soft and harmonious tints. Among such decorations an exceptionally fine one adorns the upper cover of the famous Golden Book of Frankfort-on-the-Main, and provides a most beautiful addition to the massive gold of which the cover is formed. The carved ivory relief measuring 16 x 10 in. is affixed to the centre of the cover, the edges of which extend about four inches beyond the relief. This represents Emperor Charlemagne, and beneath the figure is the inscription: "*Carolus Magnus. Synodus Franconofurtensis a. d. DCCXCIV.*" On a frieze above the emperor's figure is portrayed the Prussian eagle, over and beneath which runs the inscription: "Sub umbra alarum tuarum protege nos" ("Guard us in the shadow of thy wings"). At the base of the relief is carved the eagle of Frankfort with the German words: "Stark im Recht" ("Strong in the right"). This Golden Book is designed to record the names of the most distinguished guests of the city of Frankfort, and besides its ivory relief, the cover is

*Communicated by Gardner Teall, June 11, 1913.

richly studded with sapphires, rubies, emeralds, tourmalines, and other precious stones. The German dedication is engraved on the lower edge of the cover, and reads as follows: "Der Stadt Frankfurt a/Main gewidmet zur Erinnerung an ihr MCX Bestehen." ("Dedicated to the city of Frankfort-on-the-Main in commemoration of the eleven hundred and tenth anniversary of its foundation"). The date 794 in the inscription beneath Charlemagne's figure refers to this foundation. The names of the munificent donors of this Golden Book are perpetuated by an inscription on the side of the binding to the following effect:

"Simon Moritz v. Bethmann und seine Ehefrau Helene Anno Domini MCMIV" ("Simon Moritz von Bethmann and his wife Helene, A. D. 1904"). Four enamelled coats-of-arms ornament the strip alongside the ivory relief, those of the bishopric and of the municipality.*

The leading exponent of that branch of ivory carving in which wood and ivory are skilfully combined was the Bavarian, Simon Troger, born at Haidhausen near Munich (died about 1769). Although a poor shepherd boy, he early showed signs of his ability as a carver, and was so fortunate as to gain the patronage of Elector Maximilian III of Bavaria. His specialty in later years when he had acquired a mastery of his art was the production of small figures of beggars and gypsies, presenting types similar to those depicted by Van Ostade and others of the Dutch School of painting and etching. While Troger executed, not unsuccessfully, a number of carvings of a more ambitious type, he will always be best known for genre statuettes of the kind we have indicated, where the draperies, often in tatters, were carved out of wood, usually that of the sugar-pine, the face and the exposed part of the bodies being of ivory.

As an indication of the prices paid in recent years for some

**Jewellers' Circular Weekly.*

of the older ivory carvings, it may be noted that, in 1910, the Victoria and Albert Museum of London purchased a Byzantine ivory depicting Christ for the sum of £180, and the same institution acquired two years later, for £60, a triptych-leaf carved with an image of the Virgin, this leaf having probably formed part, with that previously mentioned, of a Byzantine triptych.*

An ivory relic of the early days of Mexico City was recently brought to light in the course of excavations made during the building of a sewer along a new street in that city. This necessitated the removal of an old church, used in late years as the chapel of a nunnery and religious school. In the foundations of the old church the devotees of long ago had buried a number of carvings and trinkets as thank-offerings, objects of no great intrinsic value it is true, but doubtless highly prized as relics or heirlooms by those who dedicated them to the church.†

The unique and powerful novel, "Salamambo," that strange and fascinating attempt of the great French *littérateur*, Gustave Flaubert, to evoke the image of ancient Carthage, has furnished in the figure of its heroine the inspiration for two most remarkable and characteristic examples of modern French art in the domain of ivory carving. These are by the sculptor Théodore Rivière, one being an entirely nude figure of the Carthaginian heroine, her head thrown back and her body rather framed than draped in the heavy folds of a long mantle. There is a feline sensuality in the face, rather suggestive of the tigress than the woman. This is perhaps less apparent in the other ivory reproduction of Salamambo by the same artist, which offers her figure and that of her infatuated admirer, Matho; here again the face

*Communicated by Dr. Cecil Smith, Curator of the Victoria and Albert Museum.

†This interesting Mexican relic was given by Henry Sayres, a banker of Mexico City, to Dr. Lee H. Smith, president of the Buffalo Society of Natural Sciences.



IVORY RELIEF

XVII CENTURY WORK, RECENTLY UNEARTHED DURING EXCAVATIONS IN A STREET IN MEXICO CITY. IT OFFERS A REPRESENTATION OF THE NATIVITY, WITH FIGURATION OF THE THREE PERSONS OF THE TRINITY.

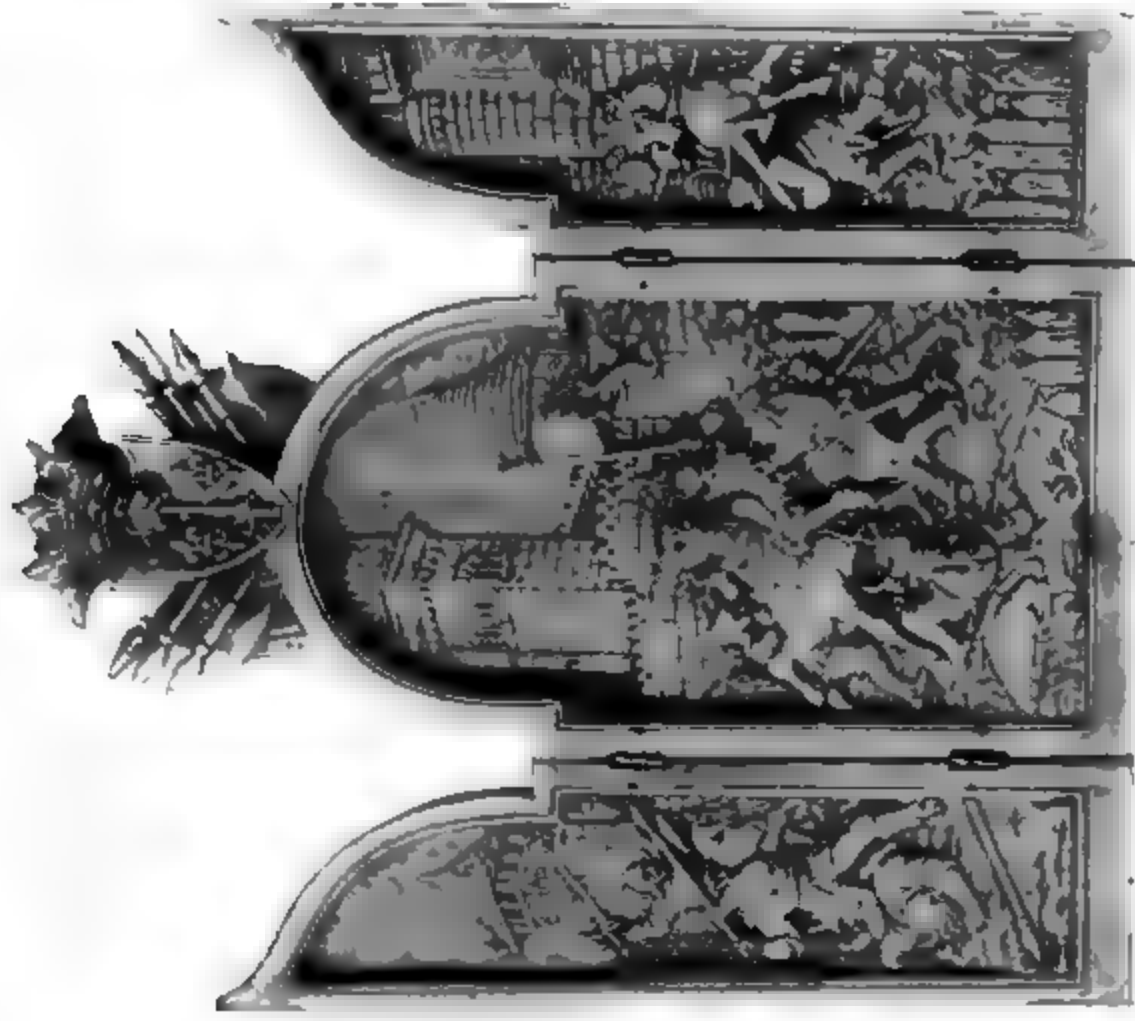
DR. HENRY LEE SMITH COLLECTION



LITURGICAL BOX

CARVED IVORY OF XII CENTURY

FROM THE MUSEUM CZARTORYSKI IN CRACOW, AUSTRIAN POLAND



IVORY TRIPTYCHS. FRENCH ART OF XVI CENTURY

I. JEANNE D'ARC AT COMPIÈGNE. HER CAPTURE BY THE BURGUNDIANS. II. FRANCIS I, ENTHRONED AND HOLDING A MAIN-DE-JUSTICE IN HIS HAND. SIDE LEAVES DEPICT SCENES FROM THE BATTLES OF MARIGNANO AND PAVIA.

GEORGE A. HEARN COLLECTION

is cruel and unrelenting, but with something less of the animal than in the single figure we have just described. In both the ivory used for the exposed flesh gains an added beauty from the overlaying or insertion of different and strongly contrasting materials.

French ivory carvings were well represented in the Panama-Pacific International Exposition in San Francisco. Among the exhibits may be noted two reliefs, "Rêverie" and "La Lecture," and a most impressive relief of Christ by Abel Lafleur. Some of the ivories of the gifted sculptor, Théodore Rivière, shown at this Exposition were the more interesting from the fact that they were still unfinished at the time of the artist's death in 1912. A completed work by Rivière was an ivory peacock resting on a mahogany tree; for this \$1,200 was asked. Two unfinished works were a "Wood Nymph," carved out of a single block of ivory, and a nude figure in this material; the price of the former was \$1,050. Rivière is said to have carved every piece through with his own hand. There were also two ivories by Mlle. O'Kin, a carved ivory box and an ivory bowl, and several small ivories were contributed by Clément Mère.*

Although ivory carving in England has not been encouraged to the same degree as it has been in Belgium, several works of exceedingly high merit and great originality of conception and design have been executed there, the artists favouring the use of many other materials in connection with the ivory, in order to give greater relief to its peculiar qualities. As successful examples may be noted the St. George of the sculptor, George Frampton, the hero-saint's figure, armour, and accoutrements exhibiting the artistic possibilities offered by a skilful combination of bronze, onyx, and mother-of-pearl with ivory. More in the style of Early Renaissance art is the Lamia of this artist; the face with its intent down-

*Communicated by Mrs. Ethel Quinton Mason.

ward gaze and impassibility of feature reminds the beholder of certain types of Italian women of the fifteenth and sixteenth centuries, whose high intellectual endowment lacked the ennobling and purifying influences of warm emotion or moral sensibility. In this bust the dress and drapery are of bronze, and an opal adornment supplements the effect produced by the sharp contrast of the mellow-hued ivory and the sombre bronze.

A group that has received much praise is the "Mors Janua Vitæ" by Harry Bates. Here the fair and delicate figure of a young girl beautifully carved in ivory is thrown into strong relief by contrast with the form of Death, entirely of bronze, suggesting in a striking way the dark portal through which all souls must pass in order to reach the new, eternal life beyond.

The universal interest that has been aroused by the most tragic figure among the rulers of our time, the unhappy King Albert of Belgium, whose courageous and sturdy defence of the little strip of his Kingdom still left to him has earned the admiration of friends and foes alike, makes the ivory representations of this sovereign more interesting to us than works of merely artistic excellence.

The most important of these ivory portraits are some medals or medallions executed within a year or two by Belgian ivory carvers. Both the King and the Queen of the Belgians have been depicted in this by the sculptor Godefroid de Vreese, these medallions being created to commemorate the foundation of the "Santoria Populaires" of La Hulpe. The originals were presented to the King and replicas are in the possession of Hon. Mr. Waroeque, a member of the Belgian Parliament. Another fine ivory portrait-medallion of King Albert has been carved by the Belgian artist, Mr. Josué Dupon, of Antwerp. Of this there exists but a single example. A memorial of King Albert's uncle and predecessor, Leopold II, is of more ambitious type, being a large ivory

bust of this monarch, made out of a number of separate pieces of Belgian Congo ivory skilfully put together. This is a work of the sculptor, Thomas Vinçotte, and is preserved in the great "Colonial Museum" of Tervueren. A copy of this bust in marble is to be seen in the Victoria and Albert Museum in London.

In the days when whaling vessels were absent from port from one to three years, it frequently happened that the men from New England who manned them had a great propensity for carving or etching. Some of them possessed considerable artistic instinct, and in unoccupied moments they would practise their art upon whale and walrus teeth, or on the bones of the whale's jaw. Sometimes their subjects would be scenes of places seen on the voyage, but more frequently they carved into the bone the faces of mothers, sisters, sweet-hearts, and wives. The work was often remarkably well done, and was known in sailor's slang as "scrimshaw work." The instruments were usually a sail-maker's needle inserted in a wooden handle, or a finely sharpened jackknife. When the carving was finished they rubbed a black fluid into it, either a dark fluid coming from the cuttlefish, or else ink. Collections of these carvings, or rather etchings, are to be found in the museum in New Bedford, in the Historical Society's museum in Newport, and in the collections of Gouverneur Morris, Mrs. William Rockefeller, A. N. Beadleston, and many others, where excellent examples are preserved.

Although the art has never been cultivated in the United States as it has been in some parts of Europe, we have nevertheless had a few very good ivory carvers here, among whom Mr. F. R. Kaldenberg deserves special mention. The fact that his father was engaged in the manufacture of goods made of ivory, as well as of amber, meerschaum, and many other materials, brought him in contact with

workers in these materials, and created an environment well calculated to develop a taste for such work in the son. The most decisive influence, however, was exerted by a very competent ivory carver, George Steffens, of Nuremberg, who was expert in designing, drawing, and engraving, as well as in sculpturing ivory, stone, and wood. As an eight-year-old boy, Mr. Kaldenberg would often stand behind this worker's chair and watch him giving an artistic form to one of the different materials he worked on. The boy's first essays on his own account were diffidently submitted to this trained artist, who, however, was so favourably impressed with them that he undertook to give the youthful aspirant regular lessons. At this time, just before our Civil War, art did not receive the encouragement it does to-day, and the gifted Steffens had to content himself with a room on the top floor of a Division Street tenement house. Thither the would-be carver hied himself every Sunday morning. Although this impromptu course of study lasted but a few years under this master, its effects were lasting, and when as a young man Mr. Kaldenberg went to Europe, he was able to make a very successful replica in ivory of the famous Venus de Milo, as a proof of what a young American of that time could do. This was 16 in. high, and therefore on a large scale for ivory work. Later the artist carved an ivory bust of Rembrandt, now in the collection of the late Mr. George W. Vanderbilt, and a very attractive Mignon bust, 16 in. high and 8 in. in diameter, made from a solid piece of ivory. But the increasing responsibilities of a business career were found too absorbing by Mr. Kaldenberg to admit of further cultivating his art at the same time.

The great Spitzer Collection, sold in Paris in 1895, was gathered together in the course of many years by the famous dealer and antiquarian, Frédéric Spitzer, a Viennese by

birth. It was magnificently housed in Paris, and had gladdened the eyes of thousands of invited guests long before the general public was admitted in the days preceding the sale. Much regret was felt that the collection could not be disposed of as an entirety, since the objects had been so carefully grouped, all useless or unworthy material being weeded out, that it was better balanced and better illustrative of the history and development of art than almost any other private collection of its time.

The ivories comprised 175 choice examples, covering the various periods of ivory carving, from the consular diptych down to modern work. The finest specimens, as was but natural, were those due to the skill of the great French carvers of the thirteenth, fourteenth, and fifteenth centuries. In his description of the ivories in the first volume of the magnificent catalogue of this collection, M. Alfred Darcel relates that Abbé Didier of Monte Cassini, later Pope Victor III, brought from Constantinople to his monastery skilled workers in gold, silver, glass, and ivory, thus founding there in the eleventh century a school of Byzantine art that long exerted a powerful influence upon Italian ivory carvers.* Many of the fine ivories from the Spitzer Collection have found their way into the great art museums of the world.

The splendid collection of art objects belonging to the late Charles T. Yerkes, which was disposed of at auction in New York City, April 11-13, 1910, besides its wonderful wealth of rare and beautiful tapestries and its many examples of rich antique furniture, as well as a number of fine statues, contained some most excellent specimens of ivory carving. Of these perhaps the most attractive was an early example of the revived taste for combining ivory with a precious metal. This is a German work of the eighteenth

*Op. cit., p. 22.

century, a group portraying St. George and the Dragon. The horse, the dragon, and the exposed parts of the rider's body are all of ivory, while the saint's armour and the trappings of his charger are wrought in silver. A jewelled base of silver repoussé supports this fine and spirited group; the earnest intensity of the conqueror's expression, the impotent rage of the dying monster, and the bold attitude of the steed, all conspire to impress the beholder.* Another interesting ivory of this collection, both on account of the subject and of the workmanship, is a bronze and ivory figure representing the great French heroine, Jeanne d'Arc, loaded with chains by her ruthless captors. The ivory carving is by E. Barries and the bronze work by Susse Frères of Paris. Inscribed are the inspired words of the Maid: "Vous avez pu m'enchaîner, vous n'enchaînez pas la future de la France"; an expression of that intense spirit of patriotism which now animates the sons and daughters of La Belle France. This statuette is 28 in. high. A carved ewer and plaque offer good examples of the style of bacchanalian ivory carvings so favoured by German artists of the seventeenth century; whatever may be the physical beauty of the semi-classic figures, all inspiration is lacking, and these and similar works, in spite of great technical excellences, belong to the decadence of art.† Of an earlier period, and on a higher plane, is an octangular memorial plaque with silver-gilt repoussé setting; along the edge are eight medallions with representations of battle scenes; in the centre a larger medallion depicts an attack upon a fortified city. A portrait head is between two of the bordering medallions, and the date 1506.‡

*Catalogue de Luxe of the Ancient Rugs, Sculptures, Tapestries, Costly Furniture, and other Objects belonging to the late Charles T. Yerkes, New York, 1910, No. 548.

†Ibid., No. 550.

‡Ibid., No. 551.

CHAPTER III

ORIENTAL IVORY CARVINGS

IN THE time of Masûdî, (b. in Bagdad—d. 956 A. D.), the author of the encyclopedic work in Arabic entitled “Meadows of Gold,” and who has been called the Herodotus of the Arabs, the principal source of African ivory was “the land of the Zenjes,” in the Upper Nile. This African ivory first went to Oman (probably to Muscat) and was thence despatched to China and India. That so much African ivory was sent to those lands was a subject of regret for Masûdî, who states that otherwise the Mohammedan countries would have been very plentifully supplied with it. A special use of ivory in China, according to this author, was for the palanquins of the great military and civil officials of the empire, as they regarded it as a token of proper respect for the emperor to be brought into his presence on an ivory palanquin. For this reason the Chinese especially valued very straight tusks, in preference to those which were curved. In their religious ceremonies the Chinese burned ivory as incense before the sacred images and on the altars.*

In India the ivory was wrought into hilts for daggers and sabres, but the most frequent use was in the carving of chessmen and a kind of checkers. The Arab writer, after noting that several of the chessmen were given the forms of

*Maçoudi, “*Les Prairies d’Or*,” text and Fr. transl. by Barbier de Meynard and Pavet de Courteille, Vol. III, Paris, 1864, pp. 7, 8.

men or of animals, asserts that as they were often a span or more in height, the chess-players had a special attendant whose duty was to move the pieces from one square to another.*

The great Sassanian monarch Khusrau II, Parwiz, whose reign began in 603 A. D., was the most luxurious of the Persian sovereigns of this dynasty. The famous Persian poet Firdausi, in his *Shah Nameh*, writes in enthusiastic phrase of this sovereign's crown, of his jewelled bracelets, and of his ivory throne. His panoply of war was no less superb, for he wore, according to Firdausi, a coat-of-mail the links of which were of gold, while each and every button was adorned with a precious stone.†

Sets of chessmen were made of ivory at an early period, usually for royal or princely devotees of this noble game. Among the oldest examples in Europe are six pieces now in the Bibliothèque Nationale in Paris, all that remain of a complete set. They are said to have belonged to Charlemagne and are believed, from their type and style, to have been made in Constantinople in the early part of the ninth century. The figures are elaborately carved and are garbed in the fashion favoured by the Greeks of the time of Charlemagne. India, however, has furnished an even earlier set of chessmen, found in the ruins of Brahmunabad in Sindh. As this city was destroyed by an earthquake in the eighth century, these pieces, which are carved into a severely simple shape without any ornamentation, must be assigned to that century at least. These are now in the East India Museum.‡

The set of ivory chessmen said to have been given by the

**Ibid.*, p. 9.

†Mme. Jane Dieulafoy, "*La Perse, La Chaldée et La Susiane*," Paris, 1887, p. 555.

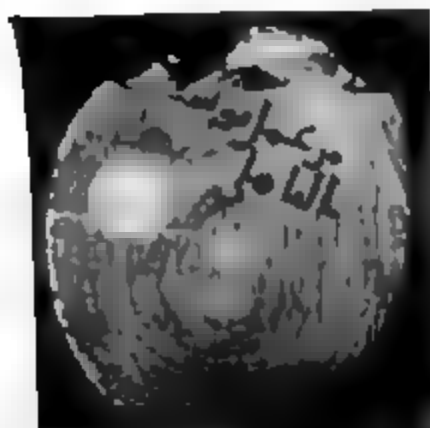
‡William Maskell, "*Ivories Ancient and Modern*," *South Kensington Art Handbooks* No. 2, pp. 77, 78.



CHARLEMAGNE'S IVORY CHESSMAN

INDIAN ART. UNDER THE BASE IS ENGRAVED THE NAME OF THE CARVER, YUSUF AL-SAHILI. ONE OF A SET GIVEN TO CHARLEMAGNE BY THE KHALIF HAROUN AL-RASHID. FORMERLY IN THE ABBEY OF ST. DENIS. FULL SIZE.

NOW IN THE BIBLIOTHÈQUE NATIONALE



BASE OF CHESSMAN BEARING SIGNATURE OF THE ARABIC IVORY CARVER. $\frac{1}{4}$ DIAM.



CHARLEMAGNE'S IVORY CHESSMAN

REAR VIEW

BIBLIOTHÈQUE NATIONALE

Chalif Haroun al-Rashid to Emperor Charlemagne, including an ivory elephant, is listed in the inventory made in 1534 of the treasures accumulated in the Abbey of St. Denis, as follows:*

Ung jeu complet de schetz d'yvire, et trente tables
aussi d'yvire qui estoient à Charles maigne non prisez.
Ung elephant aussi d'yvire taillé à plusieurs person-
nages dessus et alentour luy aussi non prisé.

Ivory playing cards have been made in the Orient, both in earlier centuries and at the present time. The collection of Mr. Francis Douce, in England, is said to contain some such cards of Hindu workmanship with gilded figures, and in Persia also ivory has been used for this purpose occasionally. In some sets of these Persian cards of the eighteenth and nineteenth centuries the cards are not engraved with figures but with groups of objects constituting numerals. A more modern set, from the nineteenth century, bears elaborately designed figures of potentates and knights, similar to our court cards; one of these cards, however, shows a tiger stretched out at full length and a rising sun. A curious entry in an old account dating from 1396 provides that 12 *sous parisis* shall be paid to Guiot Groslet as recompense for "a case to hold the queen's [Isabella of Bavaria] cards, the little ivory sticks and the rolls of parchment." Here we evidently have an instance of the use of ivory counters to mark the points in a card game.†

The pieces used in playing the game of pachesi (from *pachis*, twenty-five), a favourite diversion in India, and popularized not long since in Europe and America, are

*Bibl. Nat. MS. fr. 18766; fol. 15 of transcription in writer's library from the collection of É. Molinier.

†Henry René d'Allemagne, "Les Cartes à Jouer du Quatorzième au Vingtième Siècle," Paris, 1906, pp. 4, 8, 16, 399.

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frequently formed of ivory, the sixteen pieces employed in the Indian game being divided into groups of fours, distinguished by special colours, one set for each of the four players. The moves on the board are determined by casting six or seven cowrie shells, the value of the throw depending upon the number of those that fall with their apertures uppermost.*

An ancient use for ivory in India was for the legs of bedsteads. The Brihat Sanhita, after proclaiming this material to be the best suited for the purpose, and insisting that the legs must be of solid ivory, proceeds to give the following instructions as to the portion of the tusk which should be thus utilized: "In selecting ivory, about two thicknesses at the root of the tusk, which is hollow, should be rejected, if the animal from which it is taken come from the plains; but if it be a mountain grazer, somewhat less."† Of modern work on a large scale, Mr. Kipling notes an elaborately carved ivory couch, on the model of an English sofa, owned by the Maharajah of Benares; this was executed by carvers in his employ.‡

Some ivory chains, armlets, crosses, etc., are made in India, and we may also note a peculiar ear-ornament called *Karna-changa*, a favourite adornment of the Tipperas, a tribe dwelling in the hill country toward the northeastern frontier of Bengal. A specimen of this style of ornament was sent to the Calcutta International Exhibition, while at the Colonial and Indian Exhibition was displayed a pair of ivory armlets from Seran, in Bengal. Besides this locality the following are mentioned as furnishing ivory ornaments for personal adornment: Murshidabad, Cuttack, Amritsar, Sialkot, Multan, Pali, Indor, etc.**

*Stewart Culin, "Chess and Card Playing," Washington, 1898. Rep. U. S. Nat. Mus., 1898, pp. 665-942; see pp. 852, 853.

†T. N. Mukharji, "Art Manufactures of India," Calcutta, 1888, p. 274.

‡The *Journal of Indian Art*, Vol. I, No. 7, p. 51, July, 1885.

**J. L. Kipling, *Journal of Indian Art*, Vol. I, 1885.

The principal and very extensive use of ivory for such ornaments is shown in the production of the bangles so universally popular in India. In relation to this branch of Indian ivory carving, we cannot do better than cite the following passage from the article by Mr. J. L. Kipling, in the *Journal of Indian Art*, to which reference has already been made:

“The ivory bangle, it has been remarked, is usually a mere ring. The writer has never seen a specimen of open-work or other carving, a mode of treatment that seems suitable to the material, and well within the powers of the Indian artisan. The traditional usages of caste have probably a controlling effect. In the Panjab, on the occasion of a marriage, the Mama, or maternal uncle, of the bride is expected to present her with a set of ivory bangles coloured red, green, or black, and ornamented with tinsel spangles, or lines with minute scratched circles, as may be the peculiar fashion of the caste. The higher castes wear these only during the first year of wedlock, after which they are replaced by bangles of silver and gold or other materials. The women of some Hindu castes, however, always wear ivory. In nearly all cases the nature of the material is so disguised by colour it would appear that some cheaper substance might be made to serve equally well. In parts of the North-western Provinces ivory is not used for bangles, but they are common throughout the Panjab, in the greater part of the Bombay Presidency, in Sind, in the Central Provinces, in the Western States of Rajputana, and in parts of Bengal. The ancient town of Pali, a station on the Jodhpur branch of the Rajputana Railway, on the old trade route between Bombay and Delhi through Ahmadabad and Ajmir, maintains a specialty in bangle turnery which, according to native report, it has enjoyed for centuries, and absorbs the greater part of the ivory that is sent northward from Bombay. This

is another instance of the curious tendency of Indian crafts to be localized in out-of-the-way places in a way that is not easily accounted for. There are at Pali whole streets of ivory bangle-turners. Their wares are produced in sets of graduated sizes, covering the arm from the shoulder to the wrist, with an interval for the elbow, and they are worn almost universally in the Western Rajput States."

Ivory is a favourite material for inlays on wood in India, and much of the work done in this style merits praise. The chief centre of this branch of art at the present time is the Panjab, notably at Hushiarpur, where a great variety of household articles are so decorated, such as the small square wooden seats, called *chautis*, *almirahs* (cupboards of a special type), wall-brackets, tables, chairs, boxes, desks, rulers, picture-frames, cabinets, etc. The production of each of these objects usually requires the combined efforts of several workmen. Sometimes the ivory inlay is thrown into sharper relief by a bordering of blackened wood. Most of those engaged in this work live in the village of Ghulam Husain Bassi, in the immediate neighbourhood of Hushiarpur. This industry, which is recently revived, is now in a flourishing condition.*

These objects are comparatively inexpensive as shown by the following prices: A table 45 rupees (\$15), a wall-bracket 15 rupees (\$3), a picture-frame 6 rupees (\$2), a wall-shelf 35 rupees (\$12), a box 25 rupees (\$8 or \$9).†

In Rajputana, the town of Etawa, in the district of Kota, is to some extent a rival of Hushiarpur. Here *shisham*-wood is that principally used to receive the inlays, a fine specimen being a screen shown at the Colonial and Indian Exhibition. An interesting fact is that the industry in Kota is exclusively carried on by the members of two or three families of the

*T. N. Mukharji, "Art Manufactures of India," Calcutta, 1888, p. 245.

†Ibid., p. 247.

Khati caste; they are exceedingly painstaking in their work, which is slowly and carefully executed.

Of this special industry Mr. Kipling treats as follows:

“Of equal and, indeed, superior importance as an industry which may be expected to support skilled workmen is the wood-inlay of ivory and brass of the District. The extension of this trade to articles of European use is mainly due to the efforts of Mr. Coldstream, C. S. For many years pen-cases, walking-staves, mirror-cases, and the low *chauki*, or octagonal table common in the Panjab and probably of Arab introduction, have been made here in *shisham*-wood inlaid with ivory and brass. The patterns were very minute and covered nearly the whole of the surface with an equal spottiness. Mr. Coldstream procured its application to tables, cabinets, and other objects, and during recent years a trade has sprung up which seems likely to grow to still larger proportions. The faults of the inlay are a certain triviality and insignificance of design and its too equal and minute distribution. At various times some of the inlayers have visited Lahore, and have been shown at the School of Art examples of good Arabic and Indian design, and they have frequently been furnished with sketches. When the blackness and ugliness of an Indian village are considered it is really matter for surprise that decorative invention survives in any form. There are numbers of artisans, many of whom are in the hands of a Hindu dealer who is naturally but little concerned in the artistic quality of the wares he sells. Blackwood, the old heart-wood of the *Kunum* (*Diospyros tomentosa*), incorrectly called *abnūs* or ebony by the workmen, is occasionally used both as a ground, and in combination with ivory, as an inlaying material, especially in the familiar herring-bone pattern. Brass is also employed, but with less effect, for when foliated work in small patterns is worked in brass, it is necessary that the metal

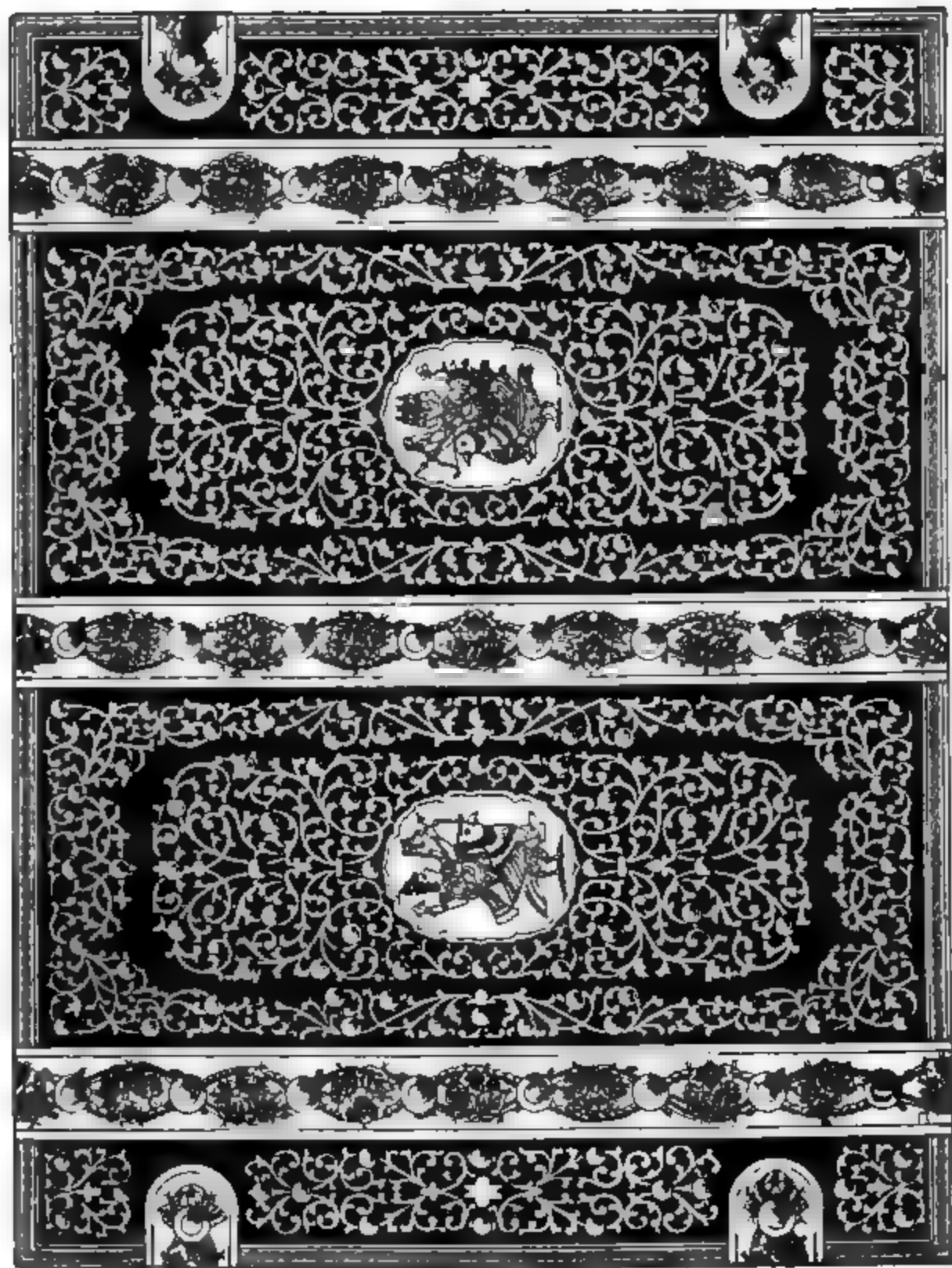
should have a better surface than it generally receives in the Hushiarpur work.”*

Hushiarpur inlayers are said to have been employed by Runjit Singh, the Lion of the Panjab, in the early part of the last century for the decoration of some of the woodwork in the Golden Temple at Amritsar, but on the whole this industry did not flourish under native rule. Of late, however, an active demand has arisen among Anglo-Indians and travellers, resulting in a largely increased production and in the exportation of this work in considerable quantity to England and other parts of Europe as well as to America, where it competes successfully with the best Chinese work of the sort. These inlayers are able to utilize an inferior quality of ivory, and also the fragments left over in the manufacture of bangles and other ornamental or useful objects, so that their ivory costs them as little as from 4 cents to 80 cents a pound. If the supply of ivory runs short camel-bone is occasionally substituted, and this is not easily detected when the work is fresh, but the bone is liable to decay and does not retain its polish as does ivory. An even less-satisfactory substitute is a wood called *chikni*, which when freshly polished has somewhat the tint of ivory.†

Cabinetwork and furniture of ebony inlaid with ivory are made in Mysore, the taste here being conservative and favouring the retention of the old models, Carneatic and Mogul. The prices obtained for this Mysore work are fairly good, a teapoy (table for the tea service) selling for 50 rupees (\$16), a chair for 100 rupees (\$33). One piece of inlay work produced here secured a gold medal at the Calcutta International Exhibition; this was a door 6 feet by 12 feet made expressly for the Bangalore Palace at a cost of 1,500 rupees

*J. L. Kipling, *Journal of Indian Art*, Vol. I.

†T. P. Ellis, "Ivory Carving in the Punjab," in the *Journal of Indian Art and Industry*, Vol. IX, No. 75, p. 47; July, 1901.



AN ISLAND WARRIOR DRESS; IVORY AND BISON BORN. VIAGAPATAM. MADE IN INDIA
—From the *Journal of Indian Art and Industry*.

(\$500). It may be here noted that in the tomb of Tippu Sultan are very beautiful doors inlaid with ivory.*

Perhaps the best-known Indian ivory inlaying is the so-called Vizagapatam work, from the Madras Presidency. Sandalwood is chiefly used here, and a great number of small but attractive articles are produced, such as work-boxes, inkstands, card-cases, chess-boards, etc. As a rule the ivory inlay is decorated with figures etched in black and showing mythological subjects or floral patterns, usually, however, from European and not from Hindu originals. As these objects are executed with a very considerable degree of technical skill they command these relatively good prices: Sandalwood and ivory inkstand 50 rupees (\$16), watchstand 25 rupees (\$8 to \$9), chess-board 55 rupees (\$18), blotting-book 40 rupees (\$13), box 135 rupees (\$45), picture-frame 10 rupees (\$3.25).†

The decoration on the ivory veneer used by the ivory workers of Vizagapatam is obtained by incising the pattern on the surface of the ivory and then filling in the incised lines with black lac. While as an ornamental addition to the boxes in question this inlay is freely used, quite frequently caskets, tables, cabinets, etc., are entirely composed of it.‡

Inlaid boxes of various kinds, the ivory being inserted in small pieces, are made in large quantities in Bombay and in Surat, Baroda, Ahmadabad, and Kach, where many other small inlaid articles are also produced. Of this class of work that able critic of Oriental art, Sir George Birdwood, says:

“A good deal of ornamental furniture is also made in ‘Bombay inlaid work,’ so familiar now in the ubiquitous glove-boxes, blotting-cases, book-stands, workboxes, desks,

*T. N. Mukharji, “Art Manufactures of India,” Calcutta, 1888, p. 248.

†T. N. Mukharji, “Art Manufactures of India,” Calcutta, 1888, p. 247.

‡Consul Henry D. Baker of Bombay, India, “Report on Ivory and Elephants in India,” June 8, 1914.



GANESA

**THE ELEPHANT GOD OF THE HINDU PANTHEON, XVII CENTURY
COLLECTION OF CHARLES L. FREER, ESQ., DETROIT**



CARVED IVORY CASKET

GIVEN BY THE MUNICIPALITY OF DELHI TO KING GEORGE AND QUEEN MARY ON THE OCCASION OF THEIR CORONATION AS EMPEROR AND EMPRESS OF INDIA. THE RELIEFS DEPICT SCENES FROM THE GREAT HINDU EPIC, THE RAMAYANA.
 $\frac{1}{2}$ DIAM.

and card-cases which go by the name of 'Bombay Boxes.' They are made in the variety of inlaid woodwork, or marquetry or tarsia, called *pique*, and are not only pretty and pleasing, but interesting on account of its having been found possible to trace the introduction of the work into India from Persia step by step, from Shiraz into Sind, and to Bombay and Surat. In Bombay the inlay is made up of tin wire, sandalwood, ebony, sappan (brazil) wood, ivory white, and stained green, and stag horn. Strips of these materials are bound together in rods, usually three-sided, sometimes round, and frequently obliquely four-sided, or rhombic. They again are so arranged in compound rods as, when cut across, to present a definite pattern, and in the mass have the appearance of rods of varying diameter and shape, or of very thin boards, the latter being intended for borderings. The patterns commonly found in Bombay, finally prepared for use, are *chakar-gul*, or 'round bloom,' *katki-gul*, 'hexagonal bloom,' *tinkonia-gul*, 'three-cornered bloom,' *tiki*, a small round pattern, and *gandiric*, 'plump,' compounded of all the materials used; also *ekdáná*, 'one grain,' having the appearance of a row of silver beads set in ebony; and *pori likur*, *jafran marapech*, *jeri*, *baelmutana*, *sankru hansio*, and *prohansio*, these eight last being bordering patterns. The work was introduced into Sind from Shiraz about a hundred years ago."

The best modern ivory carving is said to come from the establishment in Delhi conducted by Lala Faqir Chand, the art having been carried on and transmitted by four generations of his ancestors. He employs about twenty workers, with whom the industry is also hereditary; they are principally, though not exclusively, of the Brahmin caste. The general conditions are very simple, the factory being located above the shop in a small room which the ivory carvers have to share with wood carvers and miniature painters. Space

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is so restricted that some of the workers are glad to ensconce themselves on the stairs or on balconies. Their tools are of a very primitive character and the conditions under which they have to work anything but favourable, but with the patience under difficulties so natural to the Hindu artisan, they are able to execute their tasks with considerable success. An exceptionally fine piece of work that issued from this Delhi factory as many as sixty years ago, an exquisitely carved Hindu Pantheon, has only quite recently found a purchaser. The wages earned by these ivory carvers seem ridiculously small, but possibly compare not unfavourably with the very low average wage earned by other Hindu workers. Experienced carvers receive from \$1.60 to \$16 a month, according to their ability and the class of work they perform. The apprentices whose course lasts from five to seven years receive nothing during this time, and when their apprenticeship has closed but 16 cents a month at first.

The work done by the Hindu ivory carvers of the present day appears to be of a routine quality in the main, and is rarely characterized by much originality. Still the art is practised in many different localities in India and a wide range of objects are produced. In the Calcutta International Exhibition were displayed specimens from Murshidabad, Gya, Dumraon, Darbhángá, the Tributary States of Orissa, Rangpur, Bardwán, Tipperah, Chittagong, Dacca, and Patna. Of these the preference can be given to the productions of Murshidabad, because of their high finish and also because they show the ingenuity in working out minute details so characteristic of Indian ivory carving at its best. These merits are all the more praiseworthy in view of the primitive tools used by the carvers. Unfortunately, from one cause or another, the number of those engaged in this work is continually diminishing. Travancore may also be

noted as a locality in which some of the best Indian carving is done.

A particular fancy for such objects has induced some of the chiefs of Orissa and certain of the wealthy landlords of Behar to give constant employment to one or more ivory carvers so that they may exercise their art without being dependent upon the chance of selling their product. Some of the objects so produced are quite valuable, as, for example, a mat made of strips of ivory that was sent to the Calcutta Exhibition by the Maharajah of Darbhanga; this was valued at 1,325 rupees (\$440). At one time the production of such mats was a specialty of Sylhet, in Assam, but few are now made there; indeed, the art of ivory working is practically extinct in Assam to-day. In 1879 the usual prices for these mats was from £20 to £60 apiece (\$100 to \$300).*

Travancore has produced some good examples of Indian work, such, for instance, as the ivory throne with a footstool sent as a gift to Queen Victoria and shown in the London Exhibition of 1851. Sir Purdon Clarke also noted a very beautiful ivory casket from the same region in the Exhibition. At present a great many attractive small objects are made here, among these paper weights variously carved, with the design of a boa constrictor entwined about the body of an elk, a bird and a snake, an areca tree, a bird's nest, etc.

Many fair specimens of Indian ivory carving are figured in the *Journal of Indian Art and Industry*.† One represents the victory of Durgah over Mahishasura, king of the demon race called the Asurs. While the artistic qualities of this composition can hardly be considered very remarkable, it

*See James Donald, "Ivory Carving in Assam," the *Journal of Indian Art and Industry*, Vol. IX, No. 75, p. 57, July, 1901.

†Andrews, "The Elephant in Art and Industry," in the *Journal of Indian Art and Industry*, Vol. X, pp. 55-64.

shows the work of a practiced hand.* An ivory casket made in Travancore in the seventeenth century is elaborately carved and has higher artistic worth.†

Indian ivory carving offers no more attractive work than a statuette representing Ganesa, the elephant god of the Hindu Pantheon. The details are all finely wrought and testify to a complete mastery of the technique of ivory carving on the part of the artist. Ganesa is seated, in an almost erect posture, upon a small rock base having numerous niches and grottos in which are carved a number of figures including two archers with bows and arrows, a huntsman, two elephants, a lion, an ox, an ape, a monkey, a boar, and other animal designs more or less obscure. In the foreground of the base appears the emblematic rat, an almost invariable accompaniment of Ganesa figures. The god holds in his trunk the leg of a human figure which hangs suspended head downward. This admirable carving forms part of the collection of Charles L. Freer, Esq., of Detroit, Mich., who has kindly consented to have it figured in the present work.

The Northwest Provinces of India have but little to show in the way of ivory carving. Scattered throughout this region there are quite a number of workers willing enough, and to a certain extent capable enough to do good work in this branch, but there is little or no demand to stimulate their efforts. At Lucknow there is a little more activity, but not sufficient to adequately promote the industry; here are produced combs, small toys, utensils for the application of antimony to the eyes as a cosmetic, chessmen, card-cases, small models of the Taj, paper-knives, paper-weights, handles for sticks, etc., small boxes, and scissors. The art has been handed down from father to son, and is at least free

*Ibid., Pl. 91.

†Ibid., Pl. 87.

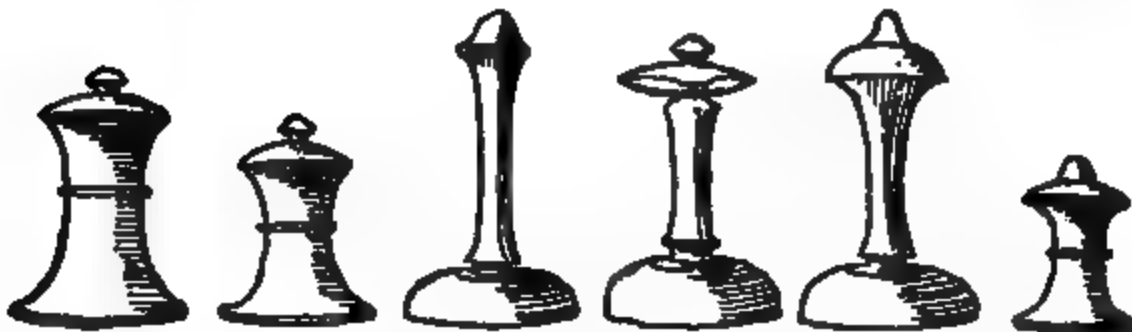
from European influences. In Nagina combs are a specialty and some good inlaying work is done; Agra produces models of the Taj. A fine set of chessmen in the Lucknow Museum is believed to have been produced in that locality, and a modern carver offered to execute an ivory set with the kings on their thrones, and with camel and elephant figures



I. INDIAN CHESSMEN of solid ivory.—After Hyde



II. INDIAN CHESSMEN of hollow ivory.—After Hyde



III. KURDISH CHESSMEN. University of Pennsylvania. Height, 1 to 1½ in.
—From Stewart Culin "Chess and Playing Cards" (Report of National Museum pp. 665-642).

for 100 rupees (\$33). As an illustration of the inactivity of the industry in these parts of India, it is stated that when the Rajah of Kashiipur and the Deputy Commissioner of Almora wanted to sell their stock of ivory, they could not market it in the Northwest Provinces, but were forced to send it to the Panjab. Such ivory as is sold offers a wide

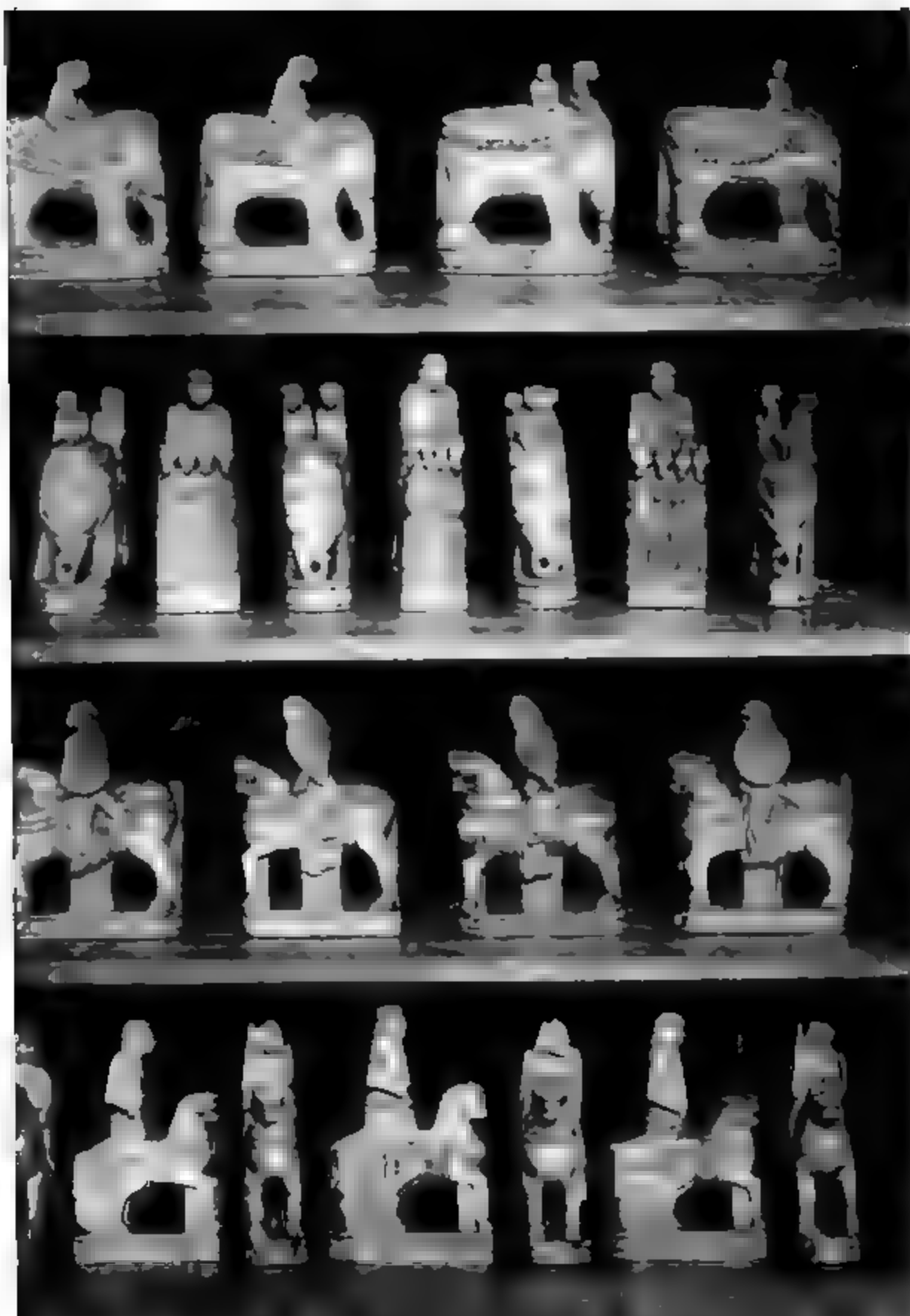
range of prices according to the size of the pieces and the elasticity and tint of the material, from 2 rupees to 20 rupees being paid for a *seer*, that is from about 16 cents to \$1.60 a pound.*

The art of miniature painting on ivory is cultivated to a certain extent in India, principally by Delhi artists who are Mohammedans and claim Persian descent. They usually take up their residence in Bombay or Calcutta and get from 10 rupees to 100 rupees for a miniature painting. The development of the art in Delhi is traced to the fondness of the Mohammedan rulers for illuminated Persian manuscripts, these serving as patterns or inspiration for the ivory painters. Thus we have portraits of emperors and empresses, as well as of famous court beauties, and views of the Taj Mahal at Agra and of the Juma Mosque at Delhi. More realistic inspiration is drawn from modern photographs which are copied in colours. Much of the work is of a purely decorative character, the miniatures being set in ebony caskets, for example; some are given a jewelled mounting to be worn as ornaments. Water colours are exclusively employed. Mr. Kipling considers that the use of photographic models has served to raise the standard of these Indian miniaturists, in that it has freed them from the stiff, conventional lines perpetuated by tradition, and has measurably brought them back to nature; this is especially notable in the treatment of landscape themes. The Delhi artists are reproached with an undue attention to mere delicacy of execution, their favourite phrase, *ek bal qalm*, "a brush of a single hair," indicating this.†

A noted Indian master in the art of miniature painting on ivory is Ismail Khan, who executed work for the late Queen

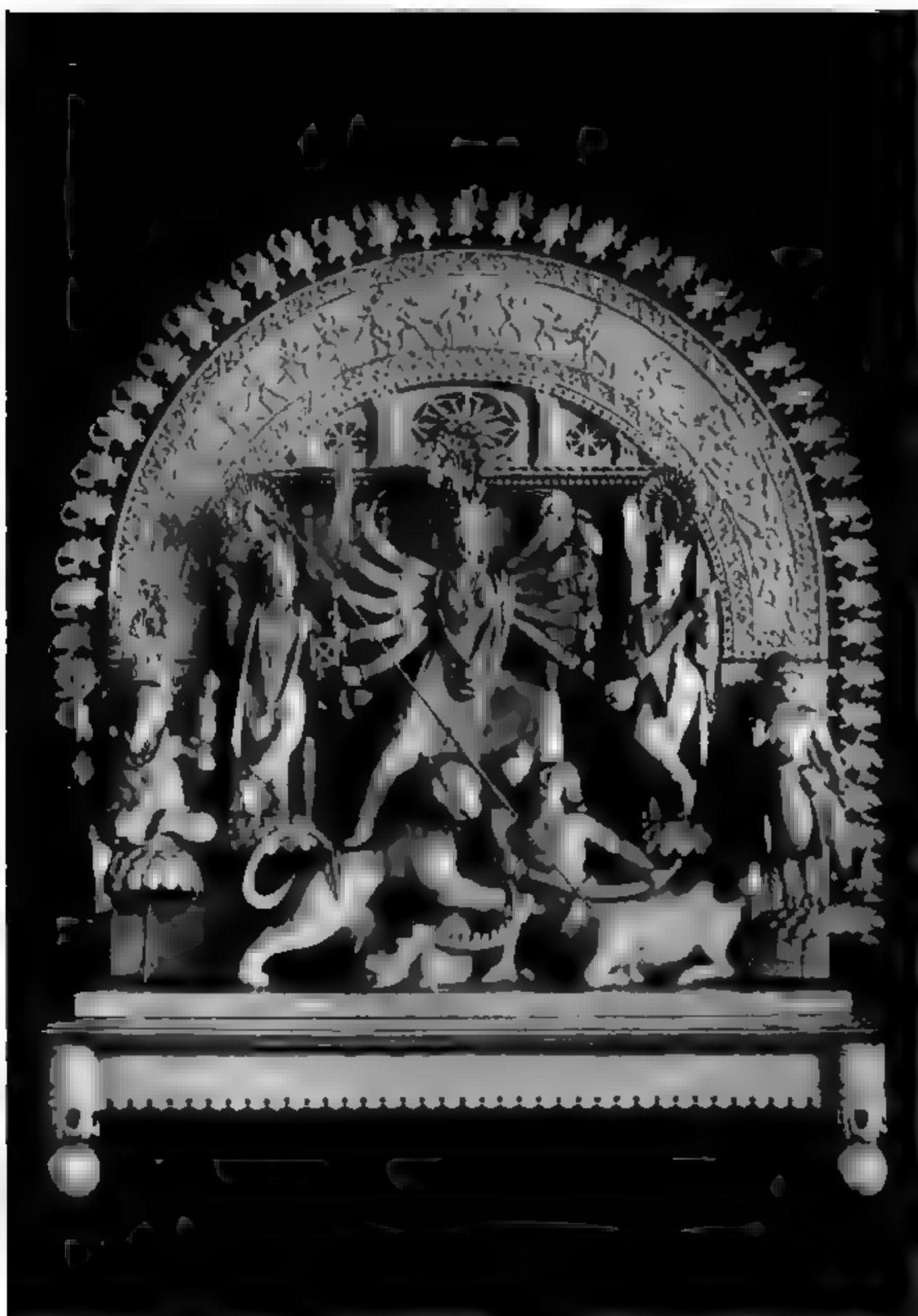
*L. M. Stubbs, in the *Journal of Indian Art and Industry*, Vol. IX, No. 75, pp. 41-44; July, 1901.

†T. N. Mukharji, "Art Manufactures of India," Calcutta, 1888, p. 22.



MEDIEVAL IVORY CARVED CHESSMEN

BIBLIOTHÈQUE NATIONALE



IVORY GROUP "DOURGA VICTORIOUS"

INDIAN CARVING. THE TEN-ARMED GODDESS HOLDS IN HER HANDS A DISK, A HARPOON, A TRIDENT, A SABRE, AN ARROW, A BOW, A SHIELD, A LASSO, A BELL, AND A POIGNARD. HER RIGHT FOOT RESTS UPON A TIGER WHICH HAS BURIED ITS CLAWS IN THE BREAST OF A DE-CAPITATED BUFFALO, OUT OF WHOSE NECK THE GIANT MAHASHÂSURA IS ISSUING, SABRE IN HAND. ON THE RIGHT OF THE GODDESS IS SKANDA ON A PEACOCK; ON HER LEFT, GANESA ON HIS RAT, ON EITHER SIDE IS A WOMAN, ONE BEARING FLOWERS, THE OTHER A MANDOLIN. AMONG THE FIGURES OF A FRIEZE ON THE ARCH SURMOUNTING THE GROUP IS THAT OF AN ELEPHANT.

MUSÉE GUINET, PARIS

Victoria. His designs embrace a considerable variety of subjects, portraits of emperors, kings, queens, and princesses, as well as Indian temples and palaces. Many of the paintings are of the usual miniature size, but some of them are so small as to be available for ring settings, while others, slightly larger, are adapted for the adornment of brooches or other ornaments.

Were it not for the constant and extensive demand for the ever-popular "bangles," and also for combs, India would not have use for the ivory she retains; unfortunately, little or no artistic skill is called for in the case of the bangles, which are commonly nothing more than plain rings of stained ivory, without decoration of any kind. The importance of the bangle trade as a whole in India may be illustrated by the statement that by the 1901 census the number engaged in making bangles of other materials than glass was 83,489, while there were 68,840 persons engaged in the sale of such bangles; for those of glass the respective figures were 75,443 and 112,821, making a grand total of 340,593 persons directly dependent upon this industry.*

The preference African ivory enjoys among Indian carvers over that of India or Ceylon is due to the fact that it has a finer grain and is less apt to turn yellow. These superior qualities have been attributed to the better food procurable by the African elephants.†

Twenty years ago Burma could boast of a master ivory carver, Maung Nyaing of Moulmein, but as a rule Burmese work does not rank high. A curious and pretty if somewhat tricky piece of art work executed by the Burmese is an ivory sword handle carved in an openwork pattern of foliage and

*Hendley, "Indian Jewellery," in the *Journal of Indian Art and Industry*, Vol. XII, No. 98, p. 46; April, 1907.

†Consul Henry D. Baker of Bombay, India, "Report on Ivory and Elephants in India," June 8, 1914.

flowers; through the openings the artist cuts out in the centre of the mass a little figure, which is so entirely separate from the enclosing decorated surface that we would suppose that it had been carved outside and then placed within the ornamental hilt.*

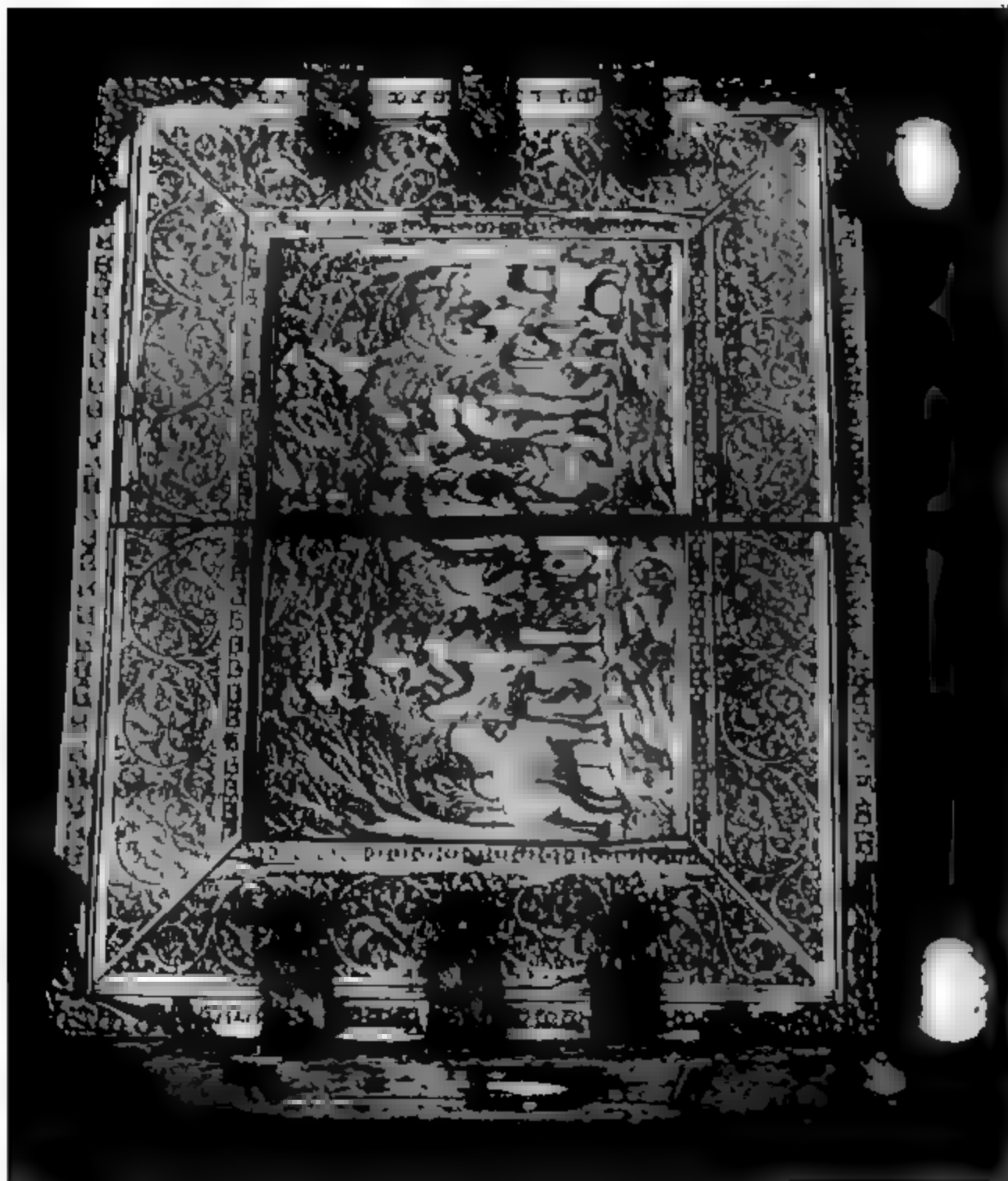
In spite of the fact that the home supply of ivory in Burma is ample, the ivory-carving industry languishes, although the few carvers still employed seem to find more than they can do. It is suggested that the opening of a school of art might serve to revive the industry, which is now essentially confined to Moulmein and Pyinmana. The total amount of ivory used in the course of a year by the carvers of Moulmein has been estimated at from eight to twelve pairs of tusks. As a rule the Burmese carver reproduces the old patterns handed down from generation to generation, unless the person giving the order prefers that he should copy some European design. While learning the art apprentices are given cocoanut shell as a material, thus avoiding the risk of having a valuable piece of ivory injured. Moreover, as cocoanut shell is more brittle than ivory, the apprentice who is able to work it without breaking it can be safely entrusted with the task of carving a piece of ivory. Little originality is exhibited by the Burmese carvers, and their art is very conventional; the products include boxes, picture-frames, handles for knives and forks, paper-knives, etc. If ordered, chessmen, mats, chairs, etc., can be made, and sometimes whole tusks are carved over with some ornamental design, one enterprising artist devoting more than seven months' time to the carving of twenty-eight different images of the Buddha as decoration to a single tusk.†

*T. N. Mukharji, "Art Manufactures of India," Calcutta, 1888, pp. 149, 279.

†H. S. Pratt, "Ivory Carving in Burma," the *Journal of Indian Art and Industry*, Vol. IX, No. 75, p. 59; July, 1901. See for a representation of this or a similarly decorated tusk from Burma, *Jour. Ind. Art. and Ind.*, Vol. I, No. 7, July, 1885, Fig. 12.



IVORY STATUETTE OF DAIRUMA
CARVED BY HOSAI, RENOWNED JAPANESE IVORY CARVER
COLLECTION OF A. N. BEADLESTON, ESQ.



IVORY CABINET WITH SILVER MOUNTS
SINGHALESE, XVII CENTURY. ADAM AND EVE IN THE GARDEN OF EDEN
V. 11. 11.

The gradual dying out of the art of ivory carving in Assam since the cessation of the rule of the Ahom rajahs is attributed to the consequent removal of the incentives due to direct royal patronage, assuring regular occupation and a stated salary or recompense to the individual carvers. Moreover, the main sources of supply for ivory have been cut off by the strict enforcement of the Elephant Preservation Act, as now only the tusks of dead elephants found in the jungle are available, while in former days a plentiful supply of ivory was secured from the elephant herds kept by the rajahs, as well as from the tusks of wild elephants slaughtered by hunters.

The art of ivory carving must have stood high in Ceylon in the seventeenth century, for it is related that at that time a native artist of this island executed in ivory a crucifix a yard in length, the work being done in such a masterly style that the hair, beard, and face of the Christ appeared those of a living being. So accurately proportioned was the whole carving, and so wonderfully were all the details worked out, that it far surpassed anything of the kind executed in Europe. For this reason the Catholic bishop (of Goa?) had the carving enclosed in a costly casing and sent it to the King of Spain as a great rarity well deserving a prominent place among his treasures.*

The finest Cinghalese ivory carving is done at Point de Galle, or Galle, as it is called in Ceylon, and here many highly artistic ivories have been produced, the designs being in some cases derived from specimens of old Buddhist art and in others inspired by scenes of the life of to-day in Ceylon. At the St. Louis Exposition, in 1904, Messrs. D. F. de Silva & Co. and Mr. Abdul Caffoor exhibited some wonderful, gem-encrusted ivory elephants, and in a great many instances

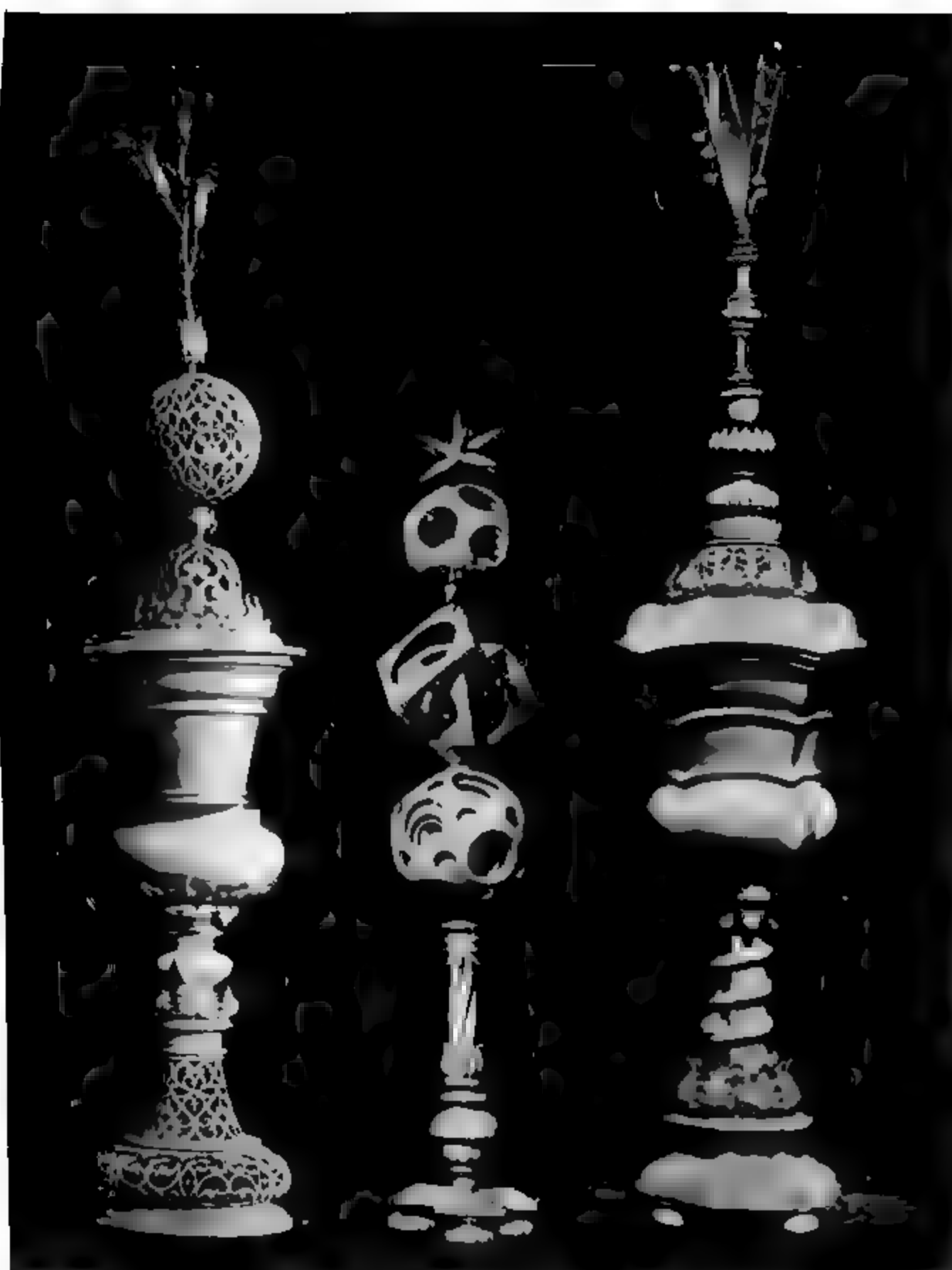
*S. de Vries, "Curieuse Aenmerckingen der bysonderste Oost en West-Indische Verwonderenswaerdige Dingen," Utrecht, 1682, Pt. IV, p. 839.

these carvings are adorned with rich and elaborate mountings of gold and gems, thus combining, as in some of the latest European work in this material, the art of the ivory carver with that of the goldsmith.*

Chinese ivory carving, of which many specimens appear in collections, is lacking in originality as compared with Japanese work of this kind, where the things of everyday life are cleverly, though rather grotesquely than naturally, depicted, the details, however, being rendered with remarkable fidelity to truth. There is also a quaint humour in the designs that has a value all its own. The many *netsukés*, or buttons, in an endless variety of curious forms, are the most characteristic productions of Japanese ivory carving, both ancient and modern. From the workshop of Kuneda, in Tokyo, come many of the finest modern pieces. Some unusually fine specimens of Japanese ivory carving made after designs by master artists were shown in the Paris Exposition of 1900. In Chinese ivory work the most original productions are the so-called "magic balls" consisting of a number of concentric, hollow spheres successively carved in openwork, the clever artist turning and carving each inner sphere through the apertures made in the one already finished; as many as half a dozen or more of these concentric balls are sometimes cut from a single piece of ivory.

There are two remarkable examples of "magic balls" in the Robert L. Stuart Collection on the third floor of the Public Library Building in New York. One of them is 5 in. in diameter and is made up of fifteen distinct balls; the other measures 4 in. in diameter and comprises nine balls. The balls are beautifully carved with minute scenes, landscapes, and figures, each of the nine balls being covered with a fret-work, very neatly rounded off and so

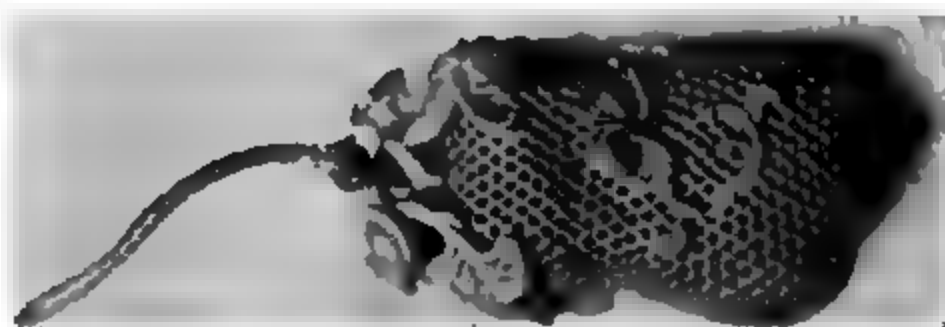
*"Official Handbook of Ceylon Court, St. Louis, World's Fair, 1904," Colombo, 1904, p. 167.



IVORY VASES

CHINESE ART OF THE XVII CENTURY

REALE MUSEO NAZIONALE, FLORENCE



IVORY SNUFF BOTTLES
CHINESE, XVIII CENTURY

minute that there are a hundred piercings to the square inch.

These balls are all cut out by a tool provided with a small curved piece of knife edge. The inner ball is cut first and decorated. Undoubtedly many of the piercings were made at one and the same time from the exterior, the drill passing through the entire five inches of ivory and thus making thirty piercings, one on either side of the fifteen spheres, or of the material from which these spheres are then successively cut out and decorated, within the centre of the group of balls. To render the working possible circular holes are run from the outer side to the middle of the ball, the outer aperture having a diameter of $\frac{2}{3}$ of an inch, the whole then tapering down to a diameter of $\frac{1}{8}$ of an inch at the centre. It is these apertures which give the artists the opportunity to reach the various surfaces of the many enclosed spheres, evolving them out of the mass, one by one.

Among the interesting modern ivory carvings shown in the Chinese section of the Panama-Pacific International Exposition was an elaborately carved elephant tusk, the work of the Chinese ivory carver, Lien Hsun-hao. This tusk, 14 in. long, is decorated with an intricate openwork pattern in which appear the dragon forms so favoured by the Chinese. There was also shown an ivory relief statuette of the Chinese Goddess of Mercy.

The Chinese exhibit contained a remarkable example of a magic ball, consisting of no less than 28 elaborately pierced balls, one within the other, the outside one having a diameter of 4 in. It is mounted on a base from which rises a slender shaft adorned with a series of loops and surmounted by the magic ball. This intricate work is valued at \$170, and is a production of the expert Chinese ivory carver, Li Hsao-yu, who was awarded a silver medal for his work. He also exhibited a finely carved tusk 30 in.

long. Another expert Chinese carver, Lien Yu-suen, showed a group of eight horses arranged in a circle, their poses being very spirited and lifelike.

The Japanese netsukés, which in their great variety of designs offer the most characteristic and interesting examples of Japanese ivory carving, and are eagerly sought by collectors, are used in Japan as "toggles" or buttons, through which pass the cords serving to attach to the belt the pipe or the medicine or sweetmeat case. The really fine specimens of these products of the ivory carver's art belong principally to the eighteenth century, and the works quite generally bear the carver's name. Some of these netsukés are of walrus and occasionally boars' tusks were used. Many of the artists had certain special designs in which they particularly excelled, and of these we may here note the following as examples:*

Anrakousai, holy personages
Hogitsu, children
Hozan, children
Mune-tomo, monkeys
Ikkouan, rats
Kajitomo, mushrooms
Mazakadzu, monkeys and rats
Okatomo, quails
Giokusai, shells

Japanese art offers, however, ivory carving of a higher grade, though we could hardly say of greater originality than the inimitable netsukés. One of the finest of these more ambitious carvings is the decoration in relief by a Japanese carver of a large tusk, having a diameter of 7 in., which was shown at the Philadelphia Centennial Exhibition of 1876 in the Egyptian Department and was acquired by the Japanese. The artist selected for his theme the embarka-

*Alfred Maskell, "Ivories," London, 1905, pp. 344 sqq.



I. DRINKING VESSEL OF CARVED IVORY

FRENCH ART OF THE XIV CENTURY

II. GROTESQUE CHINESE STATUETTE

PROBABLY OF THE XVIII CENTURY

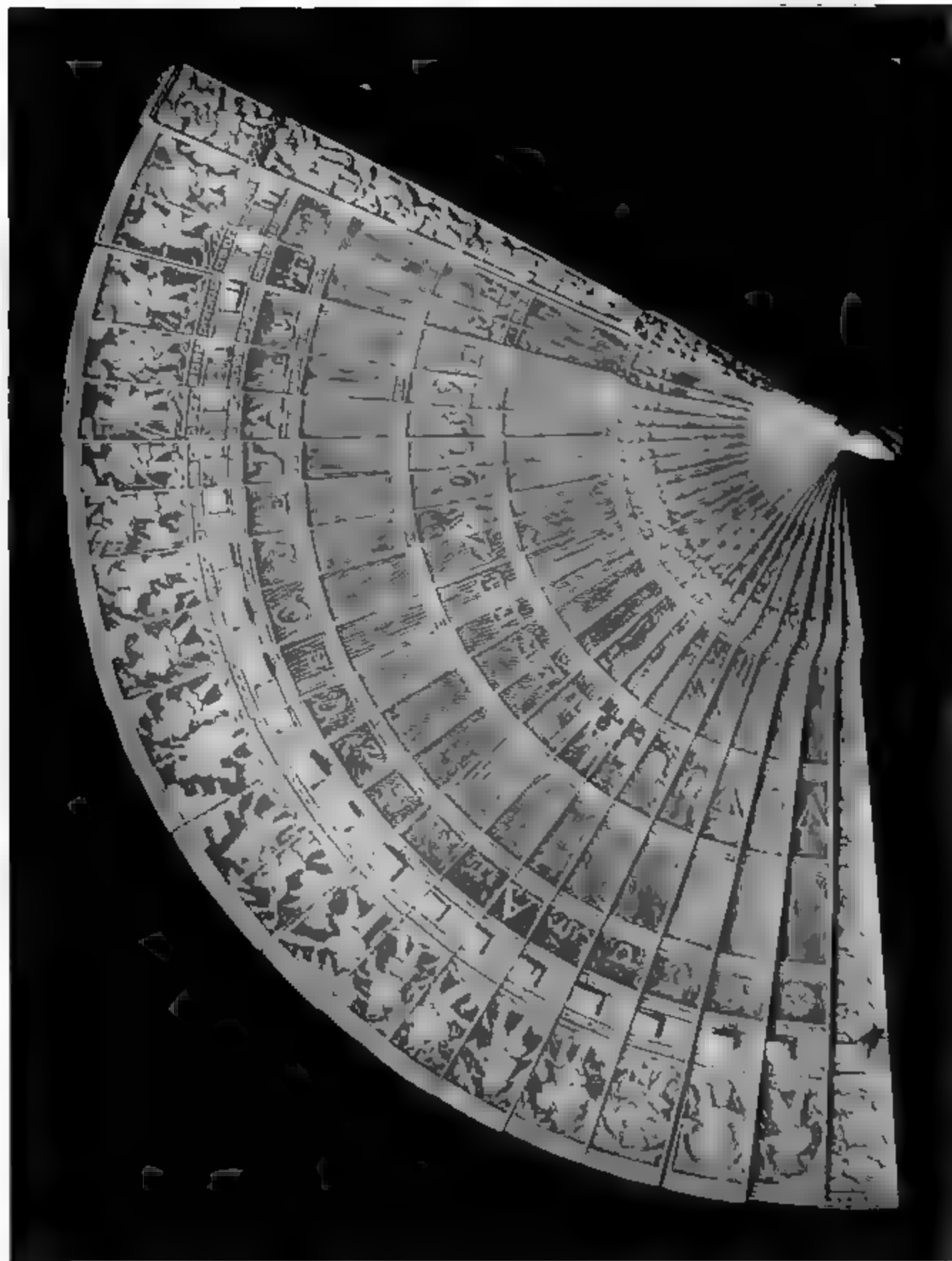
FROM THE MUSEUM CZARTORYSKI, CRACOW, AUSTRIAN POLAND



III. JAPANESE FIGURE

BEGINNING OF THE XIX CENTURY

MUSÉE GUIMET, PARIS



CARVED IVORY FAN

CHINESE; WITH FRENCH MOTTOES: **BI VOUS AIMEZ (IF YOU LOVE WHAT I LOVE), AND VOUS VOUS AIMERIEZ**
VOUS-MÊME (YOU WILL LOVE YOURSELF)

tion of Yoshitsume, a heroic figure in Japanese history, who left Japan and went into voluntary exile rather than plunge his country into the miseries of a civil war by resisting the oppression of an ungrateful brother whose throne he had assured.*

What is asserted to be perhaps the largest ivory carving ever executed is a figure of Buddha by the Japanese carver Ichikawa Komei; this was shown in the Chicago Exposition of 1893.

A most interesting and valuable Japanese publication illustrates in a very thorough and satisfactory manner the various processes employed by the ivory carver in transforming a section of tusk into a finished statuette or other artistic form. Alongside of the design representing the completed work is given in outline the piece of tusk on which the artist is about to exercise his skill. Within the outline of the yet unworked ivory is traced that of the figure to be produced, and this enables us to appreciate the judgment and ingenuity displayed by the artist in utilizing the special form of the material at his disposal. Other plates show the various stages of working the block and some of the tools used in shaping it. This valuable and original book will be more fully described in a succeeding chapter.

The carved ivory fans made by the Chinese are remarkable for the delicacy of workmanship displayed. The design is usually executed in very low relief and then the uncarved portion of the surface is cut through into a beautiful open-work pattern. Thus all heaviness is successfully banished, the fan being almost as light and airy as the element it wafts over its owner's face. Chinese tradition teaches that a native of Tamba province invented the fan in the reign of Emperor Ten-ji (668-672 A.D.); the folding-fan, however, was only introduced much later, in the reign of Kungo-lo

*Oriental Collection of W. T. Walters, p. 94.

(1403–1425), such fans having been received as part of the tribute of Korea.*

In the seventeenth and eighteenth centuries many most beautifully painted fans were executed in France, Germany, and Holland, with elaborately carved ivory sticks. Some exceedingly fine specimens of these may be seen in the Berlin Kunstgewerbe Museum, the collection being especially rich, of course, in examples of German art, but containing also a number of French fans. Typical specimens are those in which the graceful and artistic painting is done on parchment, the ivory sticks being carved in an openwork pattern.†

An exceptionally fine bit of Chinese work is an ivory hand-rest carved with representations of the 18 Lohan, or Arhats, each figure identified by its symbolic animal, vehicle, or other attribute. In the upper part of the design is figured Maitreya, the Buddhist Messiah, on a throne supported by three geniuses. The artist has taken every possible advantage of the delicate grain and mellow tone of the material he has chosen. This work probably belongs to the school of the Imperial Ivory Works, founded about 1680 by Emperor K'ang, within the precincts of the palace at Peking. Another more modern specimen, illustrating a different and thoroughly realistic style, is the model of a Buddhist temple, all the picturesque details carefully produced in the painstaking manner so characteristic of Chinese art. This model is said to have been intended as a gift from the Emperor of China to Josephine, wife of Napoleon, during the Consulate, but it was seized on the high sea by a British warship.‡

Some of the most striking specimens of Chinese art in the rich assemblage of Oriental treasures sold at the

*Georg Buss, "Der Fächer," Bielefeld and Leipzig, 1904, pp. 34, 36. Figures of Chinese carved ivory fans on p. 23 and p. 25.

†Georg Buss, "Der Fächer," Bielefeld and Leipzig, 1904; figures, among others, on pp. 74, 75, 83.

‡Stephen W. Bushell, "Chinese Art," London, 1904, Vol. I, p. 115-118, Figs. 78, 80.



IVORY PAGODA

CHINESE, LATTER PART OF THE XVIII CENTURY

MUSÉE GUMET, PARIS



MANDARINS' SCEPTRES

CHINESE ART, XVIII CENTURY

- I. DECORATED WITH "MUSHROOMS OF IMMORTALITY"
- II. SYMBOLIZES A "WISH OF HAPPINESS"
- III. DECORATED EMBLEMATICALLY

MUSÉE GUIMET, PARIS

American Art Galleries, New York City, February 16 and 17, 1915,* were some wonderfully elaborate bird cages of ivory and black lacquer, the contrasting hues being skilfully combined to heighten the artistic effect of the whole work. As decoration, along the ivory ribs of one of these cages, are attached a number of dainty and delicate ivory carvings representing dragons, birds, trees, and flowers. A circular mirror for the birds has an ivory back carved with a design showing two persons in a dug-out boat. Additional adornments are a carved white jade pendant, and a jade thumb ring to be used in lifting the cage from a hook; the lacquer base rests on ivory feet with openwork carving. The cage is $13\frac{1}{2}$ in. high with a diameter of 14 in.; at the top is a lapis-lazuli ball.† This specimen of Ch'ien lung work brought \$400 at the sale. Less elaborate in design but not less skilfully executed is a square bird cage of ivory resting on low feet. The outside decoration, severely restrained, embraces small medallions, the favourite lozenge symbol, and vases holding *mei* blossoms. The interior fittings are most artistically treated, the perch having the form of an entire wild plum tree, projecting horizontally across the cage; the water cup is carved into the form of a lotus leaf within whose folds hide a crab and a frog, and the worm tongs has been given the shape of a Buddha's hand fruit, while a seed chute is adorned with the sacred fungus toward which turn the stork and the spotted stag of Chinese legend. The height of this cage is the same as the circular one described above, $13\frac{1}{2}$ in., and each side of the square measures $7\frac{1}{2}$ in.; the price paid for it at the sale was \$400, as in the former case.‡ In still another of these choice bird cages ivory is combined with red lacquer, the form being dome shaped, with flattened

*Sold for Yamanaka & Co. †No. 186 in Catalogue; coloured plate.

‡No. 180 in Catalogue; woodcut.

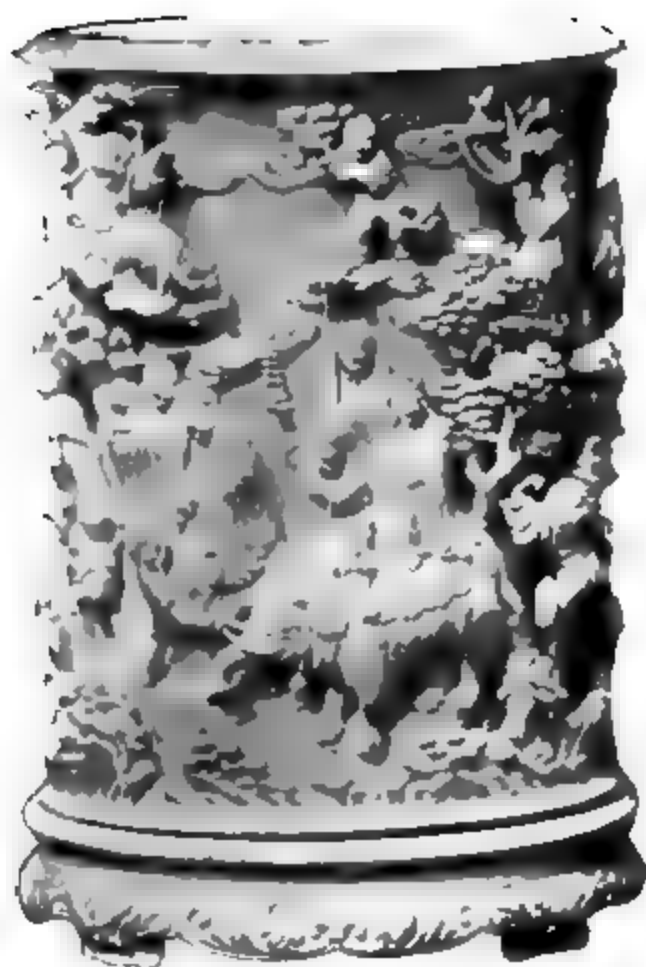
124 IVORY AND THE ELEPHANT

top. For the fittings and carved adornments ivory has been used, the desigus covering a wide field of ornamentation and showing Taoist immortals among pines and pavilions, Confucian sages with their attendant students, pine-clusters, pomegranates, birds, animals, and bats. The feet are of ivory and the chain for suspension is of jade and lapis-lazuli.* Another dome-shaped cage has for principal adornment a carved ivory dragon, its coils twining around a post showing the sacred fungus and upholding the perch. A wealth of small ivory carvings serves to embellish the exterior, embracing double gourds on their stems, cranes, legendary figures in grottos, ceremonial functions, and squirrels among grapes, the latter being a favourite Chinese *motif*. The worm tongs and feet are of ivory. This was adjudged for \$475.† The height was $22\frac{3}{4}$ in. and the diameter 14 in. The most ornate ivory carving is on a cage into the construction of which horn, boxwood, and ivory have entered as materials. The ivory carving constitutes a lofty portal or entrance, with a multitude of animal and symbolical figures, as well as a representation of the famous Li Tai Peh, to whom attendants are offering wine; surmounting the portal is a curious scene showing the ablution of an elephant, one of the attendants engaged in the task having been lifted up by the animal on trunk and tusks. The ivory mounting offers the appropriate flowers of the four seasons: lotus, peony, chrysanthemum, and plum; the continuous ivory foot is carved, among other figures, with those of two Fu-lions. For this ambitious work the purchaser paid \$400.‡ The highest-priced bird cage, one that sold for \$1,125, was of tortoise shell, but had many accessories of carved ivory, including a boatload of pleasure seekers and a central perch figuring a boy juggler, balancing himself on his head upon an immense frog,

*Catalogue No. 182; woodcut.

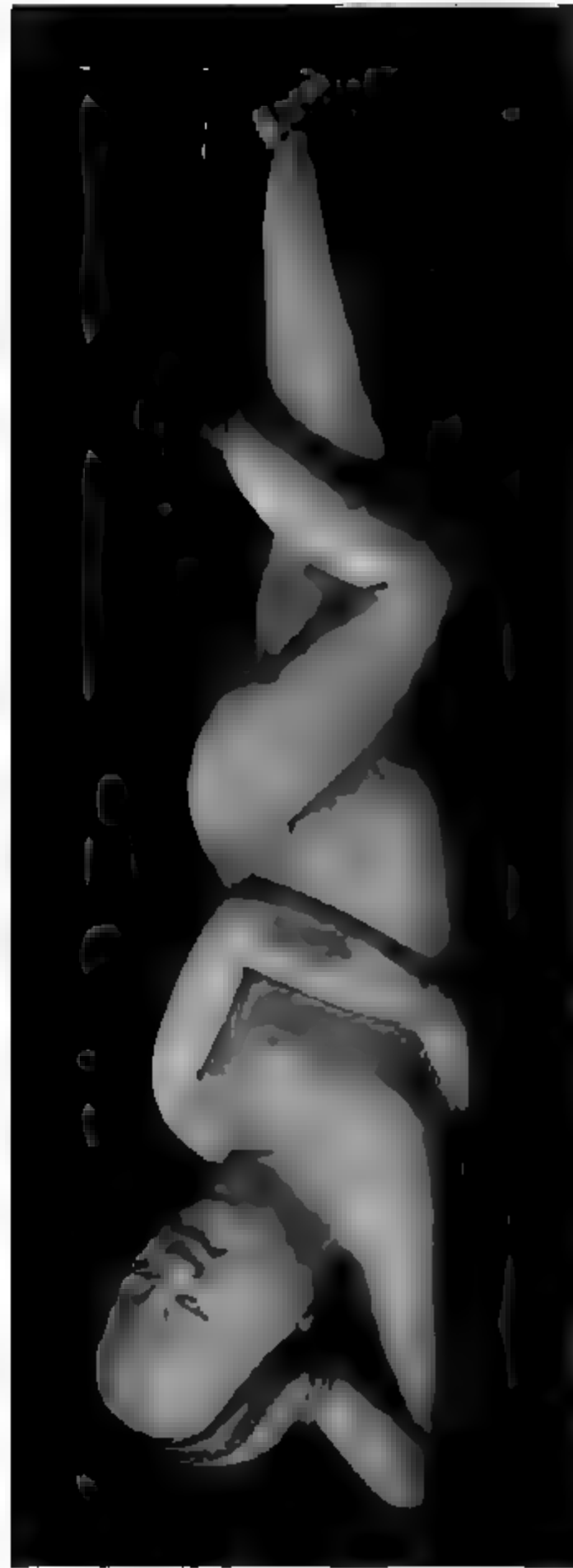
†Catalogue No. 189; woodcut.

‡Catalogue No. 1.



CARVED IVORY VASE

CHINESE WORK. TO THE LEFT, GROUP OF TAOIST IMMORTALS HIDING ON FABULOUS ANIMALS; TO THE RIGHT, SHOU LAO, GOD OF LONGEVITY, AND KUAN-YU, GODDESS OF MERCY, ON AN ELEPHANT. FROM CATALOGUE OF COLLECTION OF PRINCE KUNG OF CHINA.



IVORY MODEL OF A CHINESE WOMAN
USED BY CHINESE PHYSICIAN. COURTESY OF DR. BERTHOLD LAUFER

this being known as the Gama Sennin *motif*.^{*} Ivory carvings also adorned another tortoise-shell cage that sold for \$1,025 at this auction.[†]

This association of living creatures with delicate and artistic work is one among many instances of that happy blending of a love of both nature and art, giving proof of the high endowment of the Chinese in true esthetic perception, one of the many things that helps us to forget the backwardness of Chinese civilization in much that makes for the comfort, health, and prosperity of a people.

In the splendid collection of Prince Kung which was recently sold at auction in New York, and which consisted principally of wonderful jade carvings, there were a few very fine specimens of Chinese ivories, the most striking being two miniature representations of Imperial pleasure barges and a pair of richly adorned vases. One of the pleasure craft has a dragon-head prow, while the other is in the form of the *feng* or phoenix; all the details are carefully elaborated, and through the grillwork of the decks can be seen the Imperial chairs set in each of the staterooms. Of the vases, carved in high relief, one offers a representation of the Chinese goddess of mercy, Kwan-yin, riding on an elephant; another of the immortals is borne to heaven on a dragon's back. The other vase illustrates a procession of Taoist immortals, while hovering over them appears the fairy Si Wang Mu seated on a bird of paradise.[‡]

A Chinese ivory carving, probably some 200 years old, represents the reclining figure of a nude woman with the typically small feet. Its dimensions are 18 cm. in length and about 4 cm. in greatest height, and it is carved out of a

^{*}Catalogue No. 193.

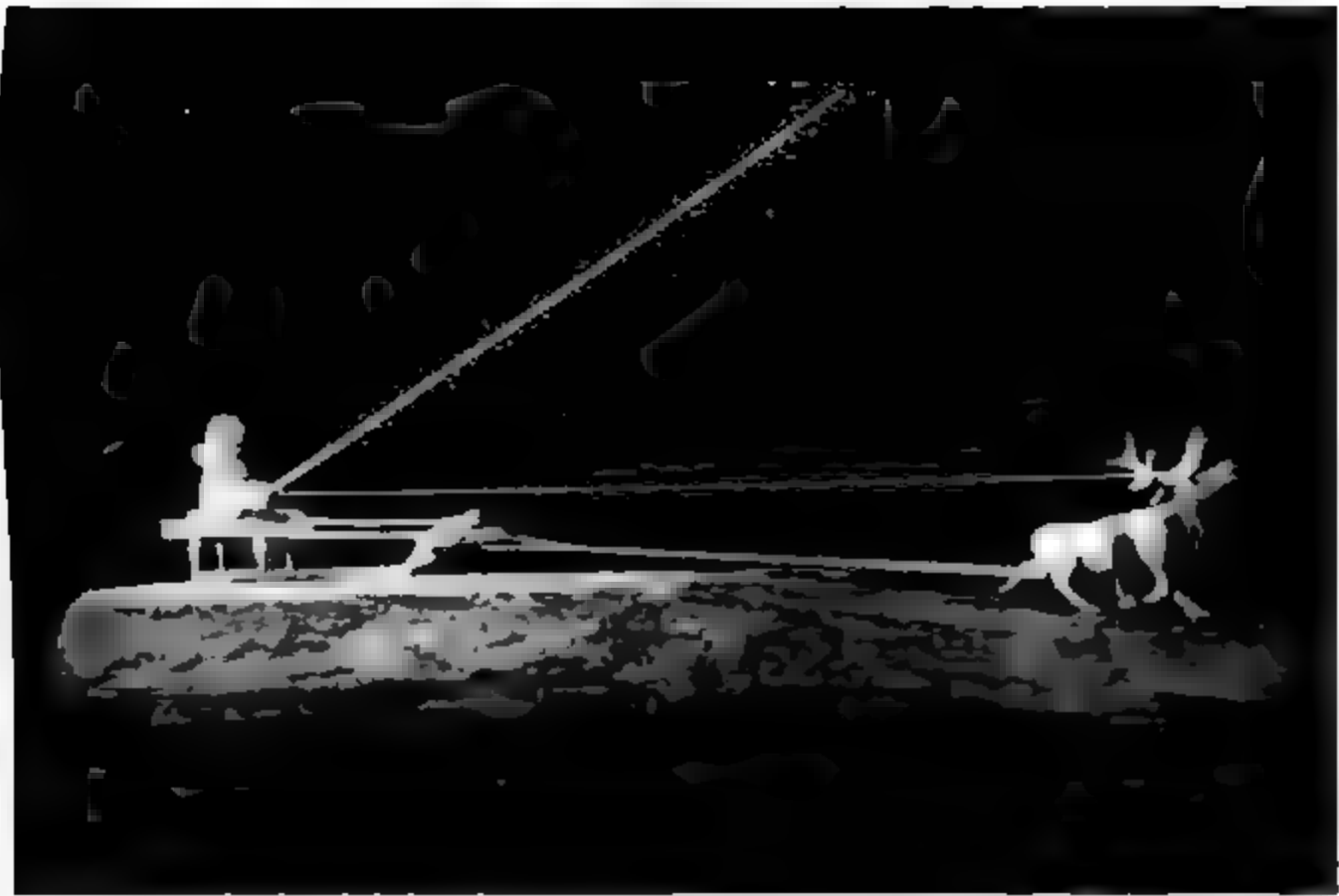
[†]Catalogue No. 194.

[‡]Catalogue of the Prince Kung Collection, sold at the American Art Galleries, Madison Square, New York, February 27, 28, and March 1, 1913. See Nos. 202, 207.

single piece of ivory. Age has imparted to it a fine yellow tone with some brownish oval spots, perhaps from handling; the shoes are coloured brown and the hair has a coating of black lacquer. This figure came, in 1850, into the possession of the oldest German resident of Yokohama, and was presented by his successor to Dr. Berthold Laufer. According to well-informed Chinese—with whose opinion Doctor Laufer inclines to agree—the women of the better class used such figures in former times to indicate to a physician the seat of their ailment. As the doctor was not permitted to see a woman of this class she would thrust her hand through a curtain opening so that he could feel her pulse, and would then lay her finger upon that part of the ivory figure which corresponded with the part of her own body that was affected. Similar figures of wood, and in former days of bronze also, have been used in China in the study of acupuncture.*

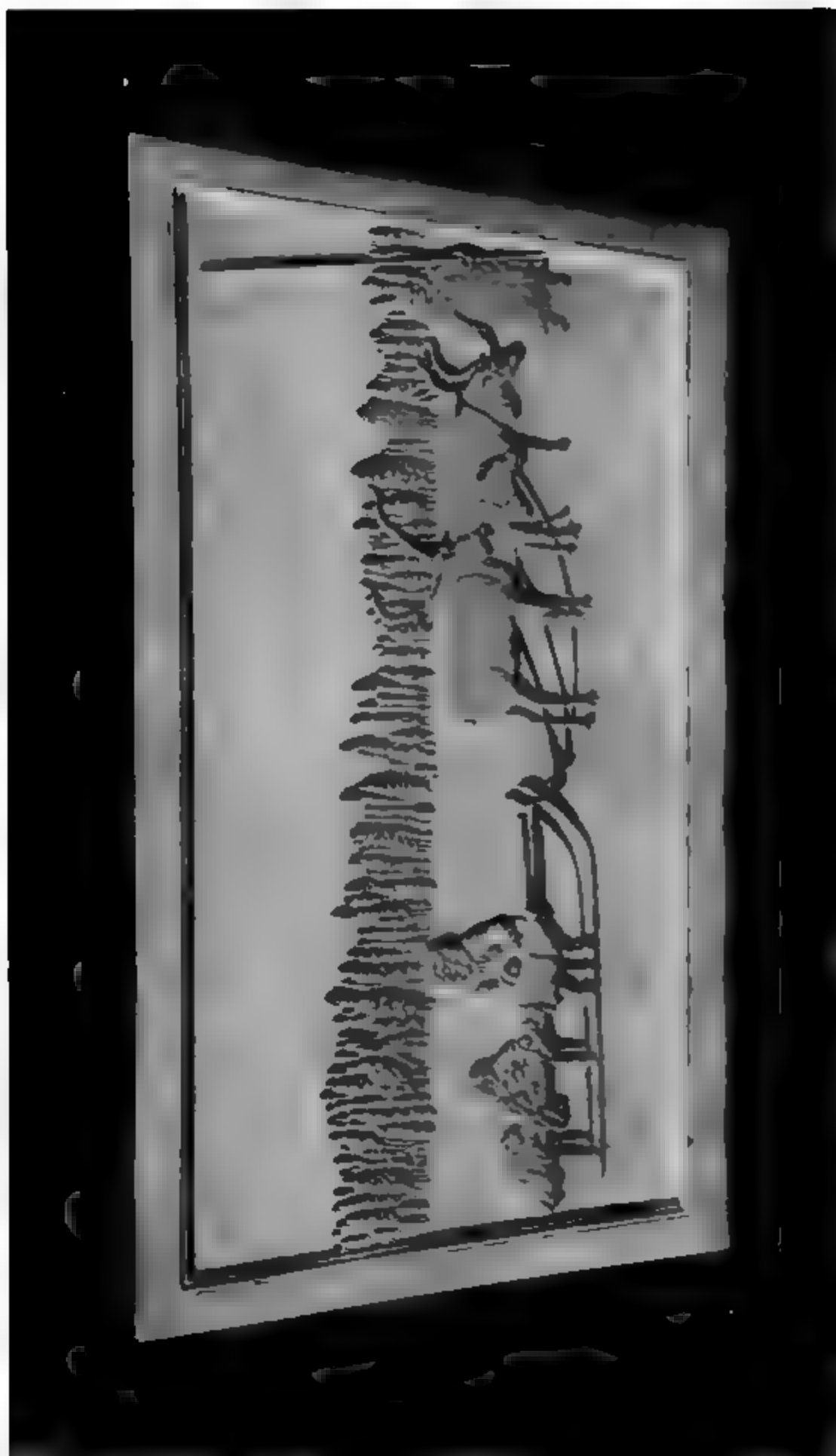
The lot of the Chinese ivory carver of Canton does not seem to be a very enviable one from a financial standpoint. During the term of his apprenticeship, which lasts four years, his master, besides supplying him with two meals a day—probably rather meagre repasts—gives him as “shoe money” \$4 in Canton silver at the expiration of the first year, \$5 at the end of the second year, \$6 at the end of the third year, and \$7 at the termination of the fourth and last year of the apprenticeship. These small figures must, however, be reduced 50 per cent. to get the equivalent in our money. After this, the ivory carver receives from his employer from \$7 to \$8 each month (\$3.50 to \$4 of our money) in addition to the two daily meals. We need feel little surprise that expert carvers should wish to earn something more, and as a general rule they prefer to work for themselves in their own houses, and are then able to earn as much as \$30 Canton silver (\$15 of our money) in a month.

*Communication of Prof. Berthold Laufer.



CARVINGS IN MAMMOTH IVORY BY SIBERIAN NATIVE

- I. REINDEER DRAWING A SLED
- II. CAMEL DRAWING A PLOUGH



RELIEF-CARVING BY SIBERIAN ESKIMO
CARVED ON MAMMOTH IVORY

COLLECTION OF HENRY WALTERS, ESQ.

The apprentices and those employed in shops are required to work ten hours each working day. However, while these are long hours, there is a very rational alternation of work and rest. Beginning his labours at 7:00 A. M., the carver continues to work until 9:30 A. M., and then is given a full hour for his morning meal; work is resumed at 10:30 A. M., continuing from this hour to 1.30 P. M., when there is a half hour's pause for tea drinking; then follows a session lasting from 2:00 P. M. until 5:30 P. M., at which hour work is again suspended and the worker is allowed two full hours for his evening meal, after which he goes to work again for two hours, his day's task finally terminating at 9:30 P. M. There are about 316 working days in the Chinese year of 360 days. The 44 days remaining are reckoned as holidays or vacations, as follows:*

New Year holidays	7 days.
Leave of absence for the "Ching Ming" term, the time when the Chinese worship the tombs of their ancestors . . .	10 days.
The 5th day of the 5th Moon—Dragon Boat Festival . . .	1 day.
The 27th day of the 8th Moon—the anniversary of the birthday of Confucius	1 day.
The closing days previous to the New Year's Festivities, when the Chinese have a general cleaning, beginning about the 25th of the 12th Moon	5 days.
Home leave, twice a year, each time ten days	20 days.
	<hr/> 44 days.

Some quite effectively carved plaques of mammoth ivory come from Tobolsk, Siberia. These offer characteristic representations of the natives of the country, showing their sledges drawn by reindeer, the animals being portrayed in a lifelike manner, while the figures of the natives, bundled up in their ample fur garments, are eminently suggestive of

*All these details as to the Canton ivory carvers were communicated to the writer by U. S. Consul-General F. D. Cheshire, in a letter dated Canton, China, August 11, 1913.

the bitter winter cold of this region. A long row of pines forms a not inartistic background. A splendid example is in the collection of Henry Walters, of Baltimore.

The skill of the Siberian ivory carvers is well expressed in a number of small but lifelike designs. A curious specimen shows us the utilization of a camel for ploughing; others depict white bears, cleverly set upon rough stone bases figuring rocks. Then we have a number of artistically carved knife-handles, presenting a series of animal heads rendered with a high degree of skill; two exceptional examples offer respectively the head of an Eskimo and the full form of a fish. An interesting little bit gives a design showing a native who has unharnessed his reindeer from his sled and pitched his tent; alongside the sled repose the *skis* for travelling over the snow-clad fields. A curious and quaint piece of carving, rather suggesting Nuremberg than Siberia in its workmanship, gives a peasant's hut with its enclosed yard, in which is a small colt. One of the best is certainly that showing a reindeer harnessed to a sled and driven by a native; the very long reins are attached to the animal's antlers, and a stick of portentous dimensions is carried by the driver as a means of giving a few gentle reminders to his reindeer when requisite. The painful effort of the poor creature to drag along the sled is graphically portrayed.*

The Central Eskimo of North America have a game called *tingmiujang*, "images of birds," played with about fifteen figures, most of them shaped as birds, but some rudely representing men and women. For these figures ivory is sometimes used. They have flat bottoms, so that when thrown upward by one of the players some or all of them may stand upright when they fall. In this case the player in whose direction the figure points gains the piece, and the one who gets the greater

*Photographs and information sent by Dr. G. Onésime Clerc, President of the Société Ouralienne des Amis des Sciences Naturelles, Ekaterinburg, Russia.

number of pieces wins the game.* Similar figures of ivory were secured from the Eskimo of Plover Bay, Eastern Siberia.† Figures closely resembling those noted above were obtained in 1882 by Mr. E. W. Nelson from the St. Lawrence Islands, Alaska, and are now in the United States National Museum, Washington; these, however, were perforated and were evidently not intended for use in any game, but as ornamental pendants to be attached to the girdle or to some part of the clothing.‡



IVORY IMAGES used as dice in game of Ting-miujang, Central Eskimo.

—From Stewart Culin "Chess and Playing Cards," Washington, 1898 (Report of Nat. Mus., 1896, pp. 665-942)

The Eskimo of Point Barrow, Alaska, have occasionally made use of fossil ivory for their utensils, and three quite well-executed dippers of this material were brought back by the American expedition to this region in 1881-1883. From the village of Nuwuk came a dipper with a large, nearly circular bowl. The rim of the bowl and the handle are neatly ornamented with a design of lines and small circles. Another of these dippers was secured at the village of Sidaru, and a third, obtained at Utkiavwin, was made of a single piece of fine-grained fossil

*Stewart Culin, "Chess and Playing Cards," Washington, 1898, p. 717, Fig. 42; pp. 665, 942 of *Rep. of U. S. Nat. Mus.* for 1896; see also Dr. Franz Boas in *Fifth An. Rep. Bureau of Ethn.*, Washington, 1888, p. 567.

†Op. cit., p. 718, Fig. 43; see John Murdoch in *Ninth An. Rep. Bureau of Ethnology*, 1892, p. 364.

‡Op. cit., p. 718.

ivory of a light yellow hue. These dippers exhibited signs of long use and were probably made many years ago. In one of them a semicircular piece of the bone, near the handle, has been broken along the grain of the tusk and is mended by three stitches.*

Many of the natives of Guinea wore, in the seventeenth century, three or four broad ivory arm-bands, frequently engraved with a cross design. These with the coral necklaces brought by Dutch and other European traders and so highly valued by the natives of the Guinea Coast constituted their chief and favourite ornaments.†

Carved elephant tusks from the old Negro monarchy of Benin are preserved in the Ethnographical Collection of the Museum of Natural History in Vienna. The conquest of Benin, West Africa, by the English in 1897 spread a knowledge of the curious art of this native civilization, although some early travellers visiting this region had already written of the strange customs and half civilization of the inhabitants.

Some surprisingly interesting specimens of ivory carving by native African artists were brought from the capital city of Benin by Mr. W. J. Hoder, when it was captured by the British punitive expedition, on February 18, 1897. Some of the best of these are on exhibition in the Harriman Museum, Forest Hill, England. One of the specimens is a mace head, or the head of an official staff, such as was carried before the high executioner—a most important personage in old Benin, or before a Ju Ju priest. It represents a king or chief—holding in one hand a sword and in the other a bell such as was rung to announce the offering of a human

*John Murdoch, "The Point Barrow Eskimo"; *Ninth Report of the Bureau of Ethnology*, 1887-1888, Washington, 1892, pp. 102, 103, Figs. 40, 41.

†S. de Vries, "Curieuse Aenmerckingen der bysonderste Oost en West-Indische Verwonderens-waerdige Dingen," Utrecht, 1682, Pt. III, p. 95.

sacrifice. Another interesting object, picked up in the palace enclosure, is an armlet or bracelet worn by one of the women of the King of Benin. The ivory is excessively thin, and the decoration executed with great care and skill. It offers the representation of six heads, evidently of European type, from the long, wavy hair. Another bracelet is decorated with eighteen heads, nine of which appear to be European, while the remaining half are of a negroid cast of features.*

The collections of the Buffalo Society of Natural History embrace a number of most interesting ivory objects presented to that institution by the West African Exhibition Company at the Pan-American Exposition. These ivories are excellent specimens of the art of the native carvers, some of whom have attained a high degree of proficiency.

In Loango, West Africa, the tusks are frequently decorated with carvings representing processions, these "processional tusks" showing spiral columns of various figures of men, children, goats, rhinoceroses, elephants, men carriers with hammocks, basket carriers, etc. They are often surmounted by figures of a monkey and a child. On some of these tusks there are ten or eleven rows of procession, beginning at the narrow end and winding downward to the hollow and broader end of the tusk. Generally the boundary of the spiral has a plain line of ivory as demarcation; sometimes a ridge of the rough brown outer coating of the tusk has been left for this purpose, or else the boundary is marked by a line of stained ivory. The ivories of this description owned by the Buffalo Society were carved by Mabeala, a Loango native artist, in Buffalo, during the summer of 1901. The outer "bark" is usually entirely

*Richard Quick, "Notes on Benin Carving," in the *Reliquary*, New Series, Vol. V, pp. 248-255; London, 1899.

removed, but in some instances this was left for demarcation and at the base of the tusk.

The small hollow end of the tusks is carved by the Loango people into napkin rings, and is decorated with designs in flowers, fish, butterflies, and other forms. In one instance the native artist has rudely scratched on a ring an inscription in broken French.

The ivory trumpets made by the natives of the Congo are among the most interesting objects produced there and prove that these natives possess a considerable amount of artistic skill. Evidently trumpets of this kind have been made for many centuries as they are still made to-day. The elephant tusk, with its graceful and elegant curve and with its natural hollow, gradually narrowing and extending through a good part of its length, gives an excellent material for the purpose. These ivory trumpets of the Congo range in size from quite small ones to specimens of great length, up to two metres (6 ft. 7 in.), although in the case of the longer trumpets the dimension has only been attained by means of a prolongation of wood or bark. Naturally the form cannot offer great variety, as it is rather strictly conditioned by the natural curve of the tusk; since, however, the walls of the tusk, as prepared for being worked into a trumpet, are much thicker at the smaller end than at the larger one, because of the gradual narrowing of the natural hollow, a considerable amount of material must be removed by the worker, and this enables him to vary the form of this portion to a certain extent, making it sometimes lozenge-shaped, and at other times hexagonal or octagonal. This circumstance is also utilized for the decoration of the surface at and near the mouthpiece with simple patterns in relief. Even with his primitive tools the patient artisan is able to accomplish his task, as the material is not very hard. Of course the degree of skill varies greatly, and some of these trumpets still show

the marks of the tools, but usually the surface has been carefully smoothed, and in some instances even polished. In a few cases a reddish or blackish tint has been imparted to the ivory. When the natural opening is too large it is partly closed with rosin, and any holes or cracks that may have been made or developed in the course of manufacture are closed with *bulungu*. In many cases the ivory surface of the trumpet is protected by a tightly fitted covering of the hide of the antelope, the buffalo, the elephant, or the iguana. While, as has been remarked, the decorative *motifs* are usually confined to the region of the mouthpiece, in some specimens from the northern part of the Congo State the entire surface is engraved with bands or stripes, and also with a dot inside a circle, a sign much used in the Egyptian Sudan, in the northeastern Congo, and on the Upper Kasai. This is the ancient Egyptian hieroglyphic symbol of the sun. The natives are always very ingenious and often very artistic in the order of arrangement and construction of the simple circles and lines; and they form a beautiful decoration to these trumpets that were capable of making a great forest resound with their blasts. Many ivory flutes are also made in the Congo, small tusks being used for this purpose.*

Since the quaint and curious netsukés, the most characteristic and original products of the Japanese ivory carvers' art, have gone out of fashion in Japan, the carvers have produced work of greater beauty and breadth of design, showing in this as in other things the wonderful adaptability and cleverness of these Frenchmen of the East. While admitting that this testifies to a certain progress in the ivory carving of Japan, some of us are unable to recognize these more ambitious productions as really superior to the old

**Annales du Musée du Congo. Ethnographie et Anthropologie. Série III. Notes analytiques sur les collections ethnographiques du Musée du Congo, publiées par la direction du Musée. Tome I, Fasc. I, Bruxelles, November, 1902, pp. 90-96, 100.*

netsukés. Still some of them are of great merit and at the same time typically Japanese.*

As examples may be noted a spirited composition of a hunter slaying an eagle. The bird, in its death struggle, has grasped one of the hunter's legs with its sharp claws, and defiantly awaits the coup-de-grâce to be inflicted by the hunter's dagger.†

Other attractive specimens of the art are two elaborately carved tusks, showing Chinese sages in a grove of bamboo. This work is 13 in. high and is an exceedingly good presentation of the Oriental scene.‡ More humorous, and somewhat in the older style, is the figure of Khensu, a Chinese Buddhist priest, in the act of fishing; the figure is 8½ in. high.** High praise has also been bestowed upon a small cabinet by the carver Tohekido Yoshi-ichi. This measures 12½ by 10½ in. and is carved and undercut with representations of quail in millet. The sides offer an imitation of basketwork.§

Chinese ivory carving at its best is displayed in the case of a remarkable vase. The elaborate openwork carving covering the entire surface of the vase offers the characteristic types of Chinese decoration: sages, trees, and small temples or retreats. The vessel is formed by the union of a number of separate plaques of ivory so carefully adjusted to one another that all trace of discontinuity is absent.

Some of the finest and most artistic work of the Siamese carvers has been shown in the elaborate decoration of entire tusks, the figures being sculptured in a series of niches cut in the circumference of the tusk. These niches are of highly

*"A Japanese Collection, made by Michael Tonkins," see Vol. I, pp. 160, 161, "Ivories," by Gleeson White.

†Op. cit., Pl. IV, 48.

‡Op. cit., Pl. IV, 32.

**Op. cit., Pl. IV, 135.

§Op. cit., Pl. IV, 272.



ELABORATELY CARVED IVORY VASE

**WITH REPRESENTATIONS, IN OPEN WORK, OF SAGES, TEMPLES, AND TREES.
MODERN CHINESE ART. WITH RIM DETACHED.**



VIRGIN AND CHILD

**SPANISH ART, FROM PHILIPPINE ISLANDS, XVII CENTURY. THIS STATUETTE
IS HOLLOW UP TO THE TOP.**

ornamental design, much openwork being used, and rise in tiers, irregularly, one row above the other. Thus the entire surface of the tusk is carved, the tip above the niches being worked out in a purely ornamental pattern. In an illustration showing five of the most striking examples of this art the graceful grouping of the tusks was striking, and the element of asymmetry skilfully introduced by placing one twisted and distorted tusk in the foreground.

Among the Tibetans ivory is but rarely used. Some of the Nomads wear decorative bracelets or rings of ivory on their cues, these ornaments, uncarved and of the simplest design, being made in India for exportation to Tibet. Examples of them may be seen in the Field Museum of Natural History, Chicago.*

Small, portable altars made of ivory and having a semi-spherical form are used by priests in Mexico in their ceremonies, on their journeys through the country either to confer baptism, listen to confession, or administer extreme unction. These portable altars measure only $2\frac{1}{2}$ or 3 in. across, and as the carvings are on the inside of the hollow hemisphere, their position effectively protects them from injury by abrasion, and the little "altars" can be safely carried about in the pocket or in any other receptacle.

Some specimens of Mexican ivory carving done in the sixteenth century, and taken from a Catholic in 1860 by an officer of Benito Juarez, were later acquired by Dr. Edward H. Thompson. While the art standard of a great part of these ecclesiastical carvings was not especially high, there was among them a Christ figure exceptionally well executed.†

*Communicated by Dr. Berthold Laufer, Field Museum of Natural History, Chicago.

†Communicated by Dr. Edward H. Thompson.

CHAPTER IV

ELEPHANTS, HISTORICAL

EARLY Egyptian art offers a few representations of the elephant, which was probably better known in pre-dynastic and early dynastic times than at a later date. A very small statuette of black stone in the Egyptian collection of the Berlin Museum unquestionably represents an elephant, and some more doubtful instances appear in certain ivory reliefs, as on a comb in the First Egyptian Room of the Metropolitan Museum of Art, New York. All of these, as well as the statuette, date from before 3000 B. C. Of the various objects made of ivory, such as combs, bracelets, pendants, spoons, statuettes, etc., and found in tombs dating from 3600 B. C. to 3000 B. C., a certain number are of hippopotamus ivory. While the elephant appears to have become less familiar to the Egyptian of the third millennium before Christ, ivory was still secured and worked and an inscription at Elephantine, on the tomb of a noble of the Sixth Dynasty (c. 2475–2025 B. C.), relates that on his return from an expedition to the southward he sent to the king a tusk 5 ft. long, retaining for his own use one 10 ft. long. Another noble, of the Twelfth Dynasty (2000–1788 B. C.), captured a live elephant which may have been brought to Egypt. The chief source of supply seems to have been the “land of Punt,” the Somali Coast and Libya, whence in the fifteenth century B. C. 700 tusks were brought. Of the 2,500 scarabs in the Metropolitan Museum only one or two are of ivory,

hence this material does not seem to have been favoured for the making of scarabs.* In a mutilated inscription of Sesostri I (1980–1935 B. C.), a king of the Twelfth Dynasty, there appears to be mention of an elephant brought to Egypt.†

The Nimrod Obelisk of the Assyrian monarch Shalmanesar II (860–825 B. C.) figures the elephant in unmistakable form, these animals being noted as part of the tribute paid by the land of Musri, while ivory was received from the Suhæans and Patæans. The tribute of Jehu, King of Israel, is also inscribed on this obelisk.‡

The elephant is probably not named in the Bible, except in the Apocryphal Books, as in various passages of the First, Second, and Third Books of Maccabees** when treating of the military forces of the Greek kings of Syria and of Ptolemy Philopater of Egypt. Ivory, indicated by the word *shen*, “tooth,” is mentioned in several passages, namely, Amos iii, 15; vi, 4; I Kings x, 18; 2 Chron. ix, 17; Ezek. xxvii, 6; Psalm xlv, 8; Cant. v, 14; vii, 5; to which must be added the *garnoth shen*, “horns of ivory” in Ezek. xxvii, 15. The New Testament contains but one reference to ivory, in Rev. xviii, 12, and here the adjective *elephantinon* is used. The marginal rendering “elephant” in the Authorized Version, for *behemoth*, is undoubtedly incorrect, as the name should certainly be rendered hippopotamus.

Both elephants and ivory are mentioned in early Chinese records. In the Chóu-li, belonging possibly to the tenth century B. C., it is stated that the trade of the province

*Personal communication of Miss C. L. Ransom, Assistant Curator in the Department of Egyptian Antiquities, Metropolitan Museum of Art, New York.

†Breasted, “Ancient Records of Egypt,” Chicago, 1906, Vol. I, p. 247.

‡“Altorientalische Texte,” ed. by Grossman, Leipzig, 1909, Vol. II, pp. 134, 135, Fig. 268; text in “Keilinschriftliche Bibliothek,” ed. Schrader, Vol. I, Berlin, 1889, p. 151.

**Macc. i, 17; iii, 34; vi, 30, 34, 35, 46; viii, 6; 2 Macc. xi, 4; xiii, 2, 15; 3 Macc. v, 1, 2, 10, 20, 38, 48. Communicated by Prof. Francis Brown of Union Theological Seminary.

King-chóu consisted of vermilion (cinnabar), ivory, and skins. The word used here for ivory, *ch'i*, literally means "a front tooth"; the commentaries, however, give it the sense of "elephant's tooth." That elephants existed in this part of China in ancient times is vouched for by many local traditions, one of which tells of an elephant seen here as late as the seventh century A. D., but these animals have long been extinct in this region.* Probably the earliest Chinese notice of ivory is in an ode attributed to the twelfth century B. C. and contained in the Shi-King, or "Book of Poetry," considered by sinologists the most ancient literary authority as to the ancient civilizations of China. Here ivory is said to have been used for decorating the bows of the chiefs. In this instance the word *siang*, elephant, is used to denote ivory; combs made of ivory are also mentioned. We are not told whence this ivory was derived, but in view of the probable existence of elephants in the south of China, it need not necessarily have been brought from without, although one of the earliest Tonkinese embassies to the Court of China is said to have brought an elephant's tusk as tribute to the Emperor Ch'öng-wang (1115-1059 B. C.).†

A Buddhist legend states that æons ago Bodhisattva was incarnated as the Chhadanta, or six-tusked elephant, and was once pursued by a wily hunter, who had assumed the disguise of a religious ascetic. Such was Bodhisattva's reverence for the sacred robe that, although he was well aware of the deception, he still broke off his tusks and gave them to the hunter.‡ The earliest sculptured figures of the elephant in India are said to be in the cave of Lomas Rishi in Behar, and are believed to date from 250 B. C., the time of King

*Friedrich Hirth, "The Ancient History of China to the end of the Chou Dynasty," New York, 1908, pp. 121, 214; Hu-nan-fang-wu-chi, Ch. viii, p. 9.

†Hirth, *op cit.*

‡Andrews, "The Elephant in Art and Industry," in the *Journal of Indian Art and Industry*, Vol. X, p. 63.



WILD ELEPHANTS—JUST CAPTURED
CEYLON

COURTESY OF DR. CHARLES S. BRADDOCK, JR.

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Asoka.* On a fragment of the Buddhist Rail we have a decidedly humorous treatment, an elephant being utilized by a troupe of monkey dentists to extract a particularly obstinate tooth by means of a long rope or cord attached to this.†

Another Buddhist legend relates that in one of the transformations of Gautama Buddha he assumed the form of an elephant known by the name of Sattan Sin Min. His sudden disappearance was regarded as desertion by his consort, who prayed that in the next transmigration of her soul a signal vengeance might be granted to her. She was born again as queen of the king of Benares, and one day, pretending to be severely ill, she declared that nothing could cure her of her malady except an ivory earring. A hunter was immediately sent out to secure tusks and got those of the transformed Buddha. The coveted earring was duly made and the queen's thirst for revenge and her vanity were gratified at the same time. This was the origin of ivory carving in Burma.‡

Indeed, the elephant appears quite often in Buddhist legend. For instance, we read in the "Kullavagga" that there was at Rajagaha an elephant named Nalagira, very fierce and a manslayer. To compass the destruction of the Buddha, Devadatta went to the elephant stables in Rajagaha and said to the elephant keepers: "I, my friends, am a relative of the Rajah and able to advance a man occupying a low position to a high position, and to order an increase of rations or of pay; therefore, my friends, when Gautama Buddha shall have arrived at this carriage-road, then loose the elephant Nalagira and let him go down the road." The

*Andrews, op. cit., p. 63.

†Andrews. op. cit., Pl. XCIII.

‡H. S. Pratt, "Ivory Carving in Burma," the *Journal of Indian Art and Industry*, Vol. IX, No. 75, p. 59; July, 1901.

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elephant keepers agreed to do so, and when the Buddha, surrounded by his disciples, reached the spot, the elephant was loosed and charged toward him "with uplifted trunk, and with its tail and ears erect." The disciples were panic-stricken, but the Buddha reassured them, and "he caused the sun of his love to pervade the elephant Nalagira," so that the animal, lowering its trunk, went quietly up to the Buddha, who stroked its forehead with his right hand. Completely tamed, the once ferocious beast returned to its quarters, and the people, filled with admiration, cried out: "They can be tamed by sticks and goads and whips, but the great Sage has tamed an elephant without weapon or stick."*

The elephant is vividly figured in an elaborately carved bas-relief frieze, illustrating a hunting scene, which adorns the great temple of Angkor Wat in Cambodia, the most recent and also the most ornate of the great Buddhist temples in this region. The entire frieze measures 324 ft. in length, and shows about one thousand figures. On the elephant's neck is seated a mahout, while a warrior armed with bow and arrows is standing, one foot on the animal's back and the other on a seat it bears, in the act of drawing his bow. This war elephant has its trunk curled back, and head erect, the rather short tusks projecting but little beyond the trunk.†

An elephant stylobate, unearthed in 1894 by the Archaeological Commissioner, on private land a mile from Anuradhapura, Ceylon, has just been set up on a lawn before the library building in Colombo. Beneath a broad platform are sculptured as supports thirty-six elephant heads, nine on each of the four sides. The whole work is exceedingly artistic and belongs to the time of the Cinghalese monarchy.

*"Kullavagga," VII, 3, 11, 12; Sacred Books of the East, Vol. XX, Vinaya Texts, Pt. III, trans. by T. W. Rhys Davids and Hermann Oldenberg, Oxford, 1885, pp. 247-250.

†Jacob E. Conner, "The Forgotten Ruins of Indo-China," in the *National Geographic Magazine*, Vol. XXIII, No. 3, pp. 209-272; illustration of elephant on p. 266 (Fournereau Collection).

Such elephant-borne platforms are quite usual in the Buddhist dagobas of Ceylon, for the elephant plays an important rôle in Buddhist legend, as it was this animal which announced in a dream to Maya Devi, mother of the celestial Buddha, the coming of the Bodhisattva. This theme was used by many Hindu sculptors whose work may be seen in Amravati and in Southern India.*

The popular fancy in some parts of India that the elephants of Ceylon were of a superior breed found expression in the story that all other elephants rendered homage to them and would prostrate themselves before them in token of veneration. Another recital concerning Cinghalese elephants is to the effect that a couple of centuries ago the East India Company sent some of them as gifts to the Sultan of Sulu; as, however, he was unable or unwilling to maintain them, they were landed and let loose at Cape Unsang, Borneo, and are believed to be the progenitors of the wild elephants on that island to-day. Of the kind of obeisance made before the Cinghalese elephant by those of other species, Tavernier declares that "by a natural instinct they pay it reverence by placing the ends of the trunk upon the ground and then elevating them."†

The famous white elephants of Burma have shared with those of Siam the repute of being incarnations of the Buddha, or at least of being living memorials of the white elephant of long ago, the form of the last incarnation of Gautama, before his birth in human form and his attainment of the dignity of the Buddha. Hence it is that one of these rare elephants is selected by the priesthood and is accorded religious honour, just as in ancient Egypt the sacred bull Apis was honoured

*Gerard A. Joseph, "The Elephant Stylobate in the Colombo Museum," in reprint from "Spolia Zeylanica," Vol. VIII, Pl. XXX, June, 1912; pp. 141, 142.

†See "Travels in India of Jean Baptiste Tavernier," trans. by Dr. Valentine Ball, London, 1889. Vol. II, p. 317, text and note citing Fryer's "Account," Calcutta; see also note pp. 318, 319.

and even worshipped at Memphis, the death of one of these bulls being immediately followed by the selection and installation of another in its place, to which the divine spirit was believed to have transferred its abode.

One of the latest members of this Burmese dynasty of elephants, perhaps the last member, was chosen about 1806, and was still living in 1856, when Col. Henry Yule visited Ava, and was then seen by him in all the glory of its gorgeous trappings, of which we have the following description:*

“The headstall was of fine red cloth studded with rubies and diamonds; the driving hook was of crystal tipped with gold, with a stem of pearls banded with rubies; the harness was made of bands of gold and crimson set with large bosses of pure gold; a golden plate inscribed with his titles was worn on his forehead, and a gold crescent set with large gems between the eyes. A minister of state waited on him and shoes were removed on going into his royal presence. A territory was assigned for his support.”

The first Burmese war necessitated the withdrawal of the elephant's subsidy, which had to be used for military expenses, but the king sought to avert the wrath this might have aroused in the heart of the royal beast by personally laying before it a petition craving pardon for the unavoidable offence, and promising full restitution as soon as possible. For better protection the elephant was removed to Mandalay, and is said to have died there on the day after the British forces took possession of that city. This must have strengthened the conviction of the Burmese of the exceptional character of this chosen and consecrated elephant, as it proved that the animal could not survive the downfall of the native rule in Burma.

The Koran makes mention of the elephant, and, indeed,

*Mrs. Ernest Hart, “Picturesque Burma, Past and Present,” London & Philadelphia, 1897, p. 167.

one of its *suras*, or chapters, the 105th, is entitled *Surat ul-Fil*, "The Chapter of the Elephant." It opens with the following verse: "Hast thou not seen how thy Lord dealt with The masters of the Elephant?" This alludes to an event that happened in the year of Mohammed's birth, 571 A. D. Shortly before that time a Christian Ethiopian sovereign, Abraha Ebn, caused a church to be built at Sanaa, designing that this should become a centre of pilgrimage for the Arabs, diverting the stream of pilgrims from the Kaaba at Mecca. This proved to be the case, and the Koreish tribe, which had charge of what had so long been regarded by the Arabs as a kind of national sanctuary, sought to stem the tide of desertion by sending a man to defile the Christian church, and thus rob it of its sacred character in the eyes of the pilgrims. The vile attempt succeeded, but the anger of Abraha was so enkindled thereby that he raised an army and set forth to destroy the Kaaba. To strike terror into the hearts of the Arabs by what to them would be a new and unaccustomed enemy he took with him thirteen war elephants.

However, Allah did not fail to protect the sacred shrine, for when the invaders neared the city of Mecca the elephant on which Abraha was riding refused to advance farther, kneeling down when an attempt was made to force him to enter the city. This checked the attack, and soon an immense flock of birds appeared in the heavens, hovered above the hostile army and dropped death-dealing stones upon it, and a torrential rain caused a flood that swept away most of the soldiers who were not struck by the stones. Thus the attack failed and the Kaaba was preserved. As the same word is used in Arabic to signify "small stones" and "small-pox," a rationalistic explanation of this recital has been that an epidemic of smallpox, then appearing for the first time in Arabia, was the real cause of Abraha's defeat. The leg-

end, marvellous as it is in its present form, is thought to have some foundation in fact, as the *sura* reciting it was composed by Mohammed not more than fifty-four years after the date of the supposed happening.*

The curious fancy, often repeated by medieval writers, that the elephant's legs were jointless, so that the animal could not lie down, is already found in Cæsar's Commentaries (of the elk) and also in Pliny (Hist. Nat., viii, 39). It also appears in the Alexandrian Greek writing called "Physiologus," which in the form now extant belongs probably to the third or fourth century of our era, although this is doubtless based upon a much earlier original, from which Pliny (23-79 A. D.) and possibly even Cæsar (100-44 B. C.) may have derived their information. An indication of the possible source of this tale is found by Dr. Berthold Laufer in a Chinese work of the Sung period which gives a story told by a seafaring man to Wu Shi-kao, a physician of the T'ang period. Here we have to do, not with the elephant, but with the rhinoceros, of which it is said that the front legs "were straight without joints," and that the animal therefore slept "by leaning against the trunk of a tree." Taking a perfidious advantage of this interesting peculiarity, "the maritime people" when seeking to capture a rhinoceros would set up on a mountain path structures of decayed timber. When a rhinoceros, taking one of them for a tree trunk, confidently selected it as his upright bed, the rotten timber would give way under his weight and he would topple in front without being able for a long time to rise. "Then," we are told, "they attack and kill it," and were thus able to obtain the much-prized horn.†

*See George Sale, "The Koran," Philadelphia, 1853, p. 499 (*sura* 105), and also J. M. Rodwell, "El Koran," London, 1876, p. 20.

†Dr. Berthold Laufer, "Arabic and Chinese Trade in Walrus and Narwhal Ivory," Leyden, 1913, pp. 49-52; reprinted from the T'oung-Pao, Vol. XIV.

The tale given in "Physiologus," referring to the elephant, runs as follows:*

"When the elephant has fallen he cannot rise, for his knees have no joints. But how does he fall? When he wants to sleep he leans against a tree, and thus he sleeps. The Indians familiar with this peculiarity of the elephant saw the tree a bit. The elephant comes to lean toward it, and as he draws near to the tree, it falls to the ground, taking him with it. After falling he is not able to rise. He begins to scream. One elephant, and then twelve others arrive to help him—in vain, until at last the small elephant appears, lays his trunk around him and lifts him."

In this form of the recital Doctor Laufer thinks that the elephant has been arbitrarily substituted for the Indian rhinoceros, of which something similar is also told by the Arab merchant, Soleiman, who travelled in India in 851 A. D. As the "Physiologus," in the form it has come down to us, always gives a symbolic Christian interpretation to its recitals, so here the fallen elephant represents Adam, the twelve elephants who vainly strive to help him, the twelve minor prophets, and by the small elephant through whose aid he is finally rescued is signified Christ.†

That war elephants were only to be found in India up to the time of Alexander the Great appears to be fairly well established, at least so far as Western literary sources go. In his "Historia Animalium," Aristotle states that the Indians employed in this way both male and female elephants. Nevertheless it is quite possible that some of the African princes had war elephants before this time. From Arrian (Lib. III) we learn, indeed, that some fifteen Indian

*E. Peters, "Der griechische Physiologus und seine orientalischen Uebersetzungen," Berlin, 1898, p. 39. Cited in Doctor Laufer's paper.

†Dr. Berthold Laufer, "Arabic and Chinese Trade in Walrus and Narwhal Ivory," Leyden, 1913, p. 51. Reprinted from the T'oung-Pao, Vol. XIV.

elephants, with Indian mahouts, were in the army of Darius when he was defeated at Arbela by Alexander, and when the latter was approaching the city of Susa the Persian satrap sent many gifts to him to secure his favour, among which were twelve elephants that Darius had secured from India.* While this shows that to a very moderate extent these animals were beginning to be utilized for warlike purposes in Persia, it essentially confirms the statement that India was still the home of the war elephant. The Greek writer Arrian, who recounted the history of Alexander's campaigns, notes in his "Tactics" that already at that period the tusks of the Indian war elephants were armed with sharp-pointed iron, both to render their thrust more deadly and to protect them from wear.†

The elephant on which the Indian king Porus rode when he encountered the Greeks of Alexander was said to have been so well trained and so intelligent that it drew out with its trunk the javelins which wounded Porus, and feeling that its master's strength was failing and that he was about to collapse, the animal knelt down to prevent him from falling to the ground. This is the story told by Plutarch in his "Solertia Animalium," but Quintus Curtius (Lib. VIII, cap. 25) gives a less romantic version, stating that the elephant only obeyed the accustomed signal to kneel down given by his mahout, and adds that the other war elephants, seeing this, did the same, thus rendering their capture by the Greeks an easy task.‡

According to a legend current in the first century of our era, Alexander dedicated to the Sun one of the boldest of the elephants he had captured from Porus in his Indian cam-

*See Gisberti Cuperi, "De elephantis in nummis obviis," Hagæ Comitum, 1719, cols. 29-44.

† "Arriani, *Techne Taktike*," II, 4, in Arriani, "Scripta Minores," ed. Hercher and Eberhard, Lipsiae, 1885, p. 105.

‡ Gisberti Cuperi, "De elephantis in nummis obviis," Hagæ Comitum, 1719, col. 44.

paign, and had its tusks adorned with gold bands on which were inscribed the words in Greek: "Alexander, son of Zeus, dedicates Ajax to Helios," showing that he had named this elephant after a Homeric hero renowned for his courage and fortitude. It was related that this same elephant was still living in the time of Domitian, four hundred or more years after the battle with Porus, and no one could tell how old he might then have been.* The story is, of course, quite apocryphal in what concerns the elephant's marvellous longevity at least, for two hundred years is regarded as the extreme age limit this animal very occasionally attains.

The splendid funeral car in which the remains of Alexander the Great were borne from Babylon to Egypt was adorned with representations of elephants,† and it has been conjectured, though without any material proof, that the generally exact description given by Aristotle of the elephant resulted from his having had the opportunity to see a specimen sent him by his former pupil, Alexander.

In a magnificent street pageant that Ptolemy Philadelphus (Ptolemy II, 309–247 B. C.) offered to the citizens of Alexandria, the most impressive feature was a colossal figure of Bacchus, twelve cubits in height, seated upon an elephant, on whose neck was a satyr five cubits high; accompanying and following this came Silenus, nymphs, satyrs, etc., the usual train of Bacchus.‡ In view of the immense proportions of the Bacchus image, it seems that the elephant must have been an artificial one, made of proportionate size.

Plato in his *Critias* (written about 400 B. C.), reciting the fable of the Island of Atlantis, which some have conjectured

*Gisberti Cuperi, "De elephants in nummis obviis," Hagæ Comitum, 1719, col. 44, citing Philostrati "De vita Apollonii," Lib. II, cap. 6.

†Diodorus Siculus, Lib. XVIII.

‡Gisberti Cuperi, "De elephantis in nummis obviis," Hagæ Comitum, 1719, col. 56, citing Callisenus Rhodius apud Athenæus, Lib. V.

to be a dim tradition of a long-lost continent in the Atlantic Ocean actually existent in time long past, relates that among the animals to be found there were many elephants, and adds that the elephant was the "largest and most voracious" of all creatures. There is a bare possibility that this Greek philosopher may have seen one or more of these animals during his sojourn in Egypt, whither he journeyed in the pursuit of his philosophical studies. That elephants were not quite unfamiliar objects to the Egyptians at a very much earlier period is testified to by the inscriptions. The indefatigable traveller and close observer, Herodotus, writing about a century before Plato's time, notes (Lib. IV, cap. 191) the presence of elephants in a region to the westward of Egypt. Thus we see that at least the more educated among the Greeks could scarcely have been ignorant of their existence, although since the disappearance of the extinct species none of these animals trod the soil of Europe before that Alexander the Great perhaps sent as a gift to his master Aristotle. This, at least, is the conclusion forced upon us by a study of the written records.

Wonderful tales are told of the immense number of war elephants used in ancient times in India, and the great Hindu epic, the "Mahabharata," leads the way by giving as the component parts of an ideal army, 109,500 infantry, 65,610 cavalry, 21,870 chariots, and 21,870 elephants; certainly a very efficient commissariat would be required to supply nourishment for a like assemblage of these huge pachyderms. Apart, however, from such poetic exaggerations, the sober statements of Greek and Roman historians and geographers are remarkable enough. Thus Strabo* (first century B. C.) asserts that the Seres had 5,000 elephants in their service, and Plutarch (ca. 46-120 A. D.)†

*Lib. XV, cap. 1.

†Vita Alexandris, cap. 62.

tells us that the Gangarides and Prasians sent 6,000 elephants to oppose the advance of Alexander after his defeat of Porus on the Hydaspes, in 327 B. C. The best authorities, however, believe that Porus himself had only about a hundred elephants in this battle.*

The first view the Romans had of elephants was in 280 B. C., when Pyrrhus, King of Epirus (318–272 B. C.), invaded Italy, and for a time, by means of his “Pyrrhic victories,” carried everything before him. Then came Hannibal’s (247–183 B. C.) invasion of Italy, elephants forming an important and much-dreaded element of his army. He is said on one occasion to have offered a Roman prisoner his freedom if he would engage in single combat with an elephant. The Roman accepted, and succeeded in killing the elephant—by cutting off its trunk, as it appears. But the wily Carthaginian was unwilling that the prestige of his elephants should be destroyed by this news reaching the Romans, and therefore, while keeping the letter of his promise and freeing the prisoner, he sent some horsemen in pursuit of him, who soon overtook him and effectually silenced this inconvenient witness.†

A somewhat curious circumstance is that Roman writers state that the African elephants were not only much less courageous than those from Asia, but also of much smaller size, so that at the battle of Thyatira in 189 B. C., between Scipio Asiaticus and Antiochus the Great (238–187 B. C.), the Romans did not dare to expose their African elephants to the attack of the Asiatic elephants of Antiochus, not merely because the former were fewer in number, but, as Pomponius Mela expressly states, because even if equally numerous the African elephants could not withstand the onset of Asiatic ones, which greatly surpassed them in size

*Armandi, “*Histoire militaire des éléphants*,” Paris. 1843, p. 35.

†See Plinii, *Historia Naturalis*, Lib. VIII, cap. 6.

and spirit.* The possession of greater courage in battle on the part of the Asiatic breed may perhaps be explained by their better training in warlike operations. Pliny, indeed, declares that African elephants were terrified at the very sight of their Asiatic cousins.† That, however, the latter should be the larger is entirely contrary to modern experience, and can only be explained by the conjecture that the elephants secured by the Romans in Northern Africa were distinctly inferior to those from the equatorial regions.

The Romans had good opportunity to compare the different races as the war elephants of Pyrrhus, the first they encountered, and later those of the Asiatic potentates they overcame were of the Asiatic race, while those led against them by the Numidian kings Jugurtha (d. 104 B. C.) and Juba (d. 46 B. C.) were Africans.‡ This latter type appears on almost all the Roman coins bearing representations of the elephant, as, indeed, African elephants were the only ones used—and these but rarely—by the Romans in military operations.** It may be noted in this connection that on coins the figures symbolizing the province of Africa almost invariably bear as a headcovering the scalp and trunk, though rarely the tusks, of the elephant.§ The Asiatic coins naturally offer us the Asiatic type of the animal.

Pliny tells us, on the authority of Mucianus, thrice consul, of a learned elephant which had been taught the Greek characters, and wrote (or spelled out) the following words in this language: "I have written and I have dedicated the

*Pomponii Melæ, "De choregraphico," Lib. II, cap. 7.

†Plinii, "Hist. Nat.," Lib. VIII, cap. 9. Ælian (hist. anm., cap. 8) states that some Indian elephants reached the height of 7 cubits, about 13 ft.

‡Armandi, op. cit., p. 278.

**Armandi, op. cit., p. 3.

§Armandi, op. cit., p. 18.

Celtic spoils.”* We may conjecture that the animal picked out the letters with its trunk, and many of us have seen trained horses, etc., perform similar tricks under expert guidance.

Writing about a century later than Pliny, Ælian also notes the performance of an educated elephant which could write out letters on a tablet with its trunk. He admits, however, that the hand of the trainer was so placed as to be able to guide the trunk, but the animal seemed to be intent on its task, and appeared to understand perfectly what it was doing. In another performance a troupe of elephants, with trappings of different colours, first executed a series of dances to the sound of musical instruments, and then took their places in proper order at immense tables, proceeding to eat and drink in imitation of a group of banqueters.†

The Italian traveller, Ludovico di Barthema, of Bologna, who journeyed through the East at the beginning of the sixteenth century, described the offensive and defensive armour of an Indian war elephant. The head and trunk were protected by a covering of mail, and as a weapon of defence, a long sword, having a blade as broad as a man's hand, was firmly attached to the trunk. The animal carried seven men, each armed with bow, lance, sword, and shield. According to this writer's report, the female elephant was both stronger and fiercer than the male of the species. The price paid for one of these animals varied from land to land, in some places it was only fifty ducats, while in others it attained the sum of one thousand or even two thousand ducats.‡

The Mogul emperors of the sixteenth and seventeenth

*Plinii, “*Historia Naturalis*,” Lib. VIII, Cap. III; Harduin notes that the Greek words would form a perfect metrical line.

†Æliani, “*Natura animalium*,” Lib. II, Cap. XI.

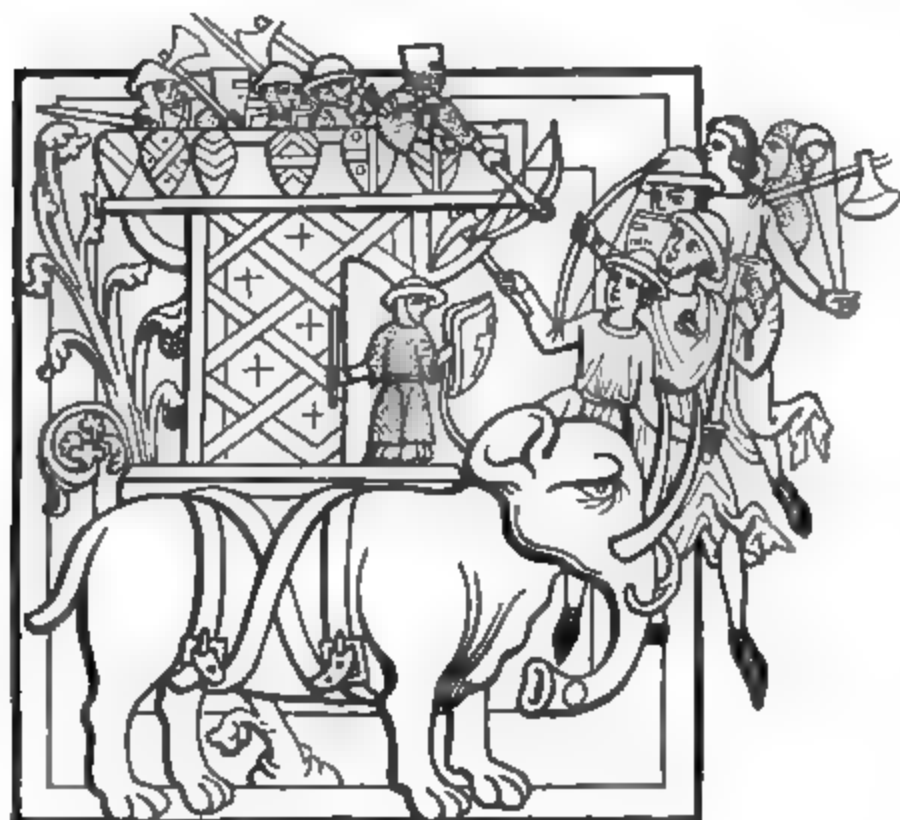
‡“*Itinerario de Lodovico Varthema*,” ed. by Alfredo Bacchi della Lega, Bologna, 1885, pp. 118-121; first edition, Rome, 1510.

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centuries undoubtedly maintained great troupes of elephants, Jehangir stating in his memoirs that he had 12,000 large elephants, and 1,000 smaller ones for carrying baggage and munitions. The one on which he himself rode was of extraordinary size and courage and was richly caparisoned with cloth of gold embroidered with precious stones; on it the monarch had bestowed the name Indra Gaja, or "Elephant of

Indra." According to Captain Hawkins, however, who visited Agra in 1609, of these elephants, 7,000 of which were males and 5,000 females, only 2,000 were trained for war.*

Nadir Shah captured three hundred war, or chain, elephants as they were sometimes called, at the taking of



* THE ELEPHANT. Drawing from a late twelfth-century MS. in the Harleian collection. (MS. Harl. No. 4751, fol. 8 verso.)

Delhi in 1739, and later sent two of these as a present to the Sultan in Constantinople. These animals not only had been trained to war, but had also been taught to dance at the sound of an instrument.† One of the queer ideas entertained by Indian elephant trainers is that if one puts gold and silver in a bowl of water and bathes a refractory

*Ibid., pp. 453, 454.

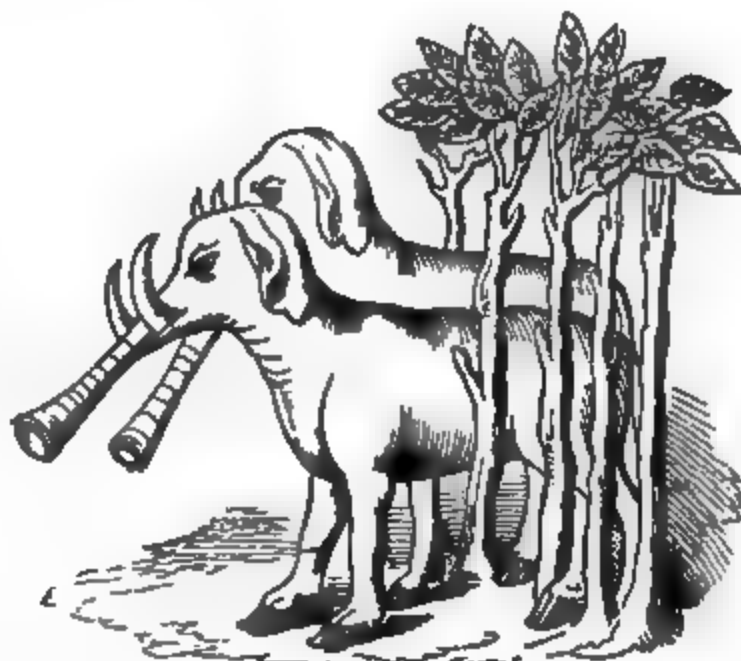
†John Ranking. "Historical researches on the wars and sports of the Mongols and Romans," London, 1826, p. 99.

elephant with the water, he will obey the goad with alacrity.*

The first elephant seen in Germany is said to have been one sent by Caliph Haroun al Rashid to Emperor Charlemagne. The animal was safely landed at Pisa in 801 A. D., but there was considerable delay in conveying it to Charlemagne's court at Aquisgranum (Aachen, Aix-la-Chapelle), where it arrived only in the ensuing year. Its death in 810 is duly chronicled in an old record. In or about 1254 England was also favoured with the gift of an elephant from Louis IX of France, St. Louis, to Henry III of England, of which Polydore Virgil says it was an animal most rare in England (*rarissime in Anglia*).†

The great world war has brought into use many new and startling methods and inventions, but it has also witnessed a revival of certain de-

fensive weapons of earlier centuries, notably of the metal shield as a means of individual protection. The innovations have not, however, been confined to inanimate objects, for in one case at least an elephant has been utilized by the Germans in the construction of military works. This elephant was brought to Breslau from the Hagenbeck zoölogical garden at Hamburg. Of course, in certain parts of central and southern Asia, especially in



THE ELEPHANT as represented in a MS. illustration to a twelfth-century copy of an Alexander romance. (MS. Reg. 15, E. VI.)

*Armandi, "Histoire militaire des éléphants," Paris, 1843, pp. 528, 529.

†Angl. Hist., Lib. XVI.

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Burma, elephants are still in use as traction animals and may therefore be occasionally employed in the building of fortifications, but this European instance is quite unique.

On March 20, 1513, the Portuguese envoy to the papal court, Tristan da Cunha, entered Rome conducting an elephant destined as a gift to Pope Leo X, who had a great taste for the collection of wild animals. This rare and singular present of course excited unbounded curiosity, but the poor beast did not long survive in its new home, for its death is recorded on June 16, 1516.*

Pope Leo X is stated to have made use of his elephant in a burlesque ceremony at the expense of the Abate de Gaeta, a verse writer of the period. He caused the poor abbé to be mounted on the elephant's back, and ordered that he should be thus paraded through the streets wearing a crown made of laurel and cabbage leaves. This shows that then, as in our own day, in our Occidental world where the elephant is a rarity, no idea of dignity or majesty is associated with the act of riding upon it, while in Roman times, when troops of elephants were brought to Italy and the animal must have become, for the inhabitants of Rome at least, a familiar sight, conquerors and emperors were proud to have their chariots drawn by these animals at triumphal processions.

The sixteenth-century author, Cardano, states that he had seen an elephant, thirteen years old, which belonged to Mary, Queen of Bohemia, a daughter of Emperor Charles V. This animal was so obedient to the commands of its guide that when led before the Bishop of Milan it knelt down and saluted him with its head. When it was commanded to speak, it trumpeted. Cardano states that he had more than once seen curved tusks six cubits long, which,

*Louis Madelin, "Le journal d'un habitant Français de Rome au XVI siècle," in *Mélanges d'Archéologie et d'Histoire*, XXII ème Année, 1902, p. 277.

had they been straight, would have measured fully seven cubits in length.*

The first elephant that trod American soil since the far-off days of mastodon and mammoth was brought to the United States in 1815 and bought by Hackaliah Bailey of Somers, New York. The rather prosaic name of "Bet" was bestowed upon this animal, which on its arrival in New York Harbour on board a sailing vessel was trans-shipped to a river craft and finally landed on the shore of the Hudson at Sing Sing, the present Ossining. To avoid the risk of causing runaways through the instinctive terror felt by horses at the first sight of this ponderous and formidable brute, the journey by land from the shore to Somers was made at night, and the elephant arrived safely at its destination and future home. There, and in the surrounding towns and villages, it was long exhibited to the delectation of the more or less unsophisticated natives of that early time, and became the central attraction of what may be regarded as the pioneer American circus, organized and managed by Mr. Bailey, who doubtless realized many times told over the \$1,000 he had expended for his rare beast.

So closely did he feel that his fortunes were bound up in "Bet" that when, in 1827, he built a hotel in the town of Somers, with the proceeds of his show and circus, he called it the "Elephant Hotel" and set up near it a stone pedestal 15 ft. high on which was placed an immense, carefully carved wooden image of his elephant. This interesting memorial is still to be seen to-day.

In this hostelry the cattle dealers and drovers of the day were wont to assemble, and thousands of cattle were sold here annually. Later on Bailey went into the banking

*Cardani, "De Subtilitate," Basileae, 1554, p. 307, Lib. X. On the basis of the Roman cubit (17.4 in.) this would be 8 ft. 4.4 in., or 10 ft. 1.8 in. "along the curve."

business and established the Farmers' and Drovers' Bank in one half of the "Elephant Hotel." This was regarded as one of the strongest banking institutions in the State; it went into liquidation in 1905. Many distinguished men found their way from time to time to Bailey's hotel, and it was here that Commodore Vanderbilt became acquainted with Daniel Drew; Washington Irving and Nathaniel Hawthorne were also visitors.

How old the elephant was when Mr. Bailey bought it of his seafaring brother we do not know, but it survived until 1845, and the skin was then mounted by the great showman, Phineas T. Barnum, and shown for several years in his "Museum" in New York City, where it was destroyed with the other objects of the heterogeneous collection gathered there when the building housing them was burned down in 1866. The man to whose enterprise our country owed its first example of one of these great pachyderms passed away at the ripe age of seventy, September 2, 1845, the very year in which his elephant died, and his life seems to have illustrated the words chiselled on his tombstone: "Enterprise, Perseverance, Integrity."

A notable case of self-immolation on the part of a military leader to secure a victory is told of Eleazar, brother of Judas Maccabee. At the battle of Bethzacharias, in 163 B. C., between the Jewish forces and those of Antiochus V. Eupater, the valiant Eleazar noted that one of the war elephants of the Syrians was conspicuous for its size and especially richly caparisoned. He therefore concluded that this animal bore the king. Animated by the desire to strike terror into the hearts of the Syrians and also to earn immortal fame for himself, he forced his way through the ranks of the enemy until he had reached this elephant. Crouching down, he then got under the animal's body and wounded it mortally with his sword, but was crushed to death

beneath the enormous mass of the elephant as it fell to the ground.*

The administration of stimulants to war elephants in order to render them more ferocious has not always redounded to the advantage of those using this treatment. The example cited in the Third Book of Maccabees is a good illustration of this. In 210 B. C. the Egyptian monarch, Ptolemy Philopater, after suppressing an insurrection of the Jews of Alexandria, designed to have a number of his prisoners trampled to death by elephants in the Hippodrome for the delectation of the Alexandrian populace. To ensure effective results he directed that the elephants should be dosed from the previous day with a mixture of frankincense and wine. The keepers carefully carried out these instructions and the elephants developed a due degree of ferocity, but unfortunately they were no respecters of persons, and instead of venting their fury upon the unhappy Jews, they trampled down the Egyptian guards.

Another case of devotion, this time on the part of a loyal servitor to save the life of his master, is related by Tavernier. On one occasion when Shah Jehan and one of his sons were riding on an elephant, the animal suddenly developed an insane fury, so that the mahout completely lost control over its actions. Quickly realizing that should the elephant continue its mad rush through the woodland they were traversing his sovereign and the prince would inevitably be dashed to pieces against the trees, the faithful servant determined to sacrifice his life in their defence, only begging that his three children should be cared for after his death. He then jumped down to the ground, whereupon the elephant seized him with its trunk, cast him down and trampled out his life beneath its ponderous feet. This act of violence satisfied the creature's rage, and it immediately became quiet and

*I Maccabees, VI, 43-46; see also Josephus Ant. of the Jews, XII, IX, 4.

tractable. Shah Jehan is said to have given 200,000 rupees in charity as a thank-offering, and to have awarded important court offices to the sons of the man who had so courageously saved his life and that of the prince.*

A favourite sport of Shah Jehan was to pit two of his war elephants against each other, and this led on one occasion to grave peril for his son and successor, Aurengzeb. The two elephants chosen had been incited to action, not always an easy task, for the animal in its normal state is anything but ferocious. Not improbably an exciting drink of some kind had been administered, as was customary in bracing up the courage of war elephants before a battle. The action had scarcely been engaged when one of the pair sought temporary safety in flight, the other elephant charged in pursuit, and as Aurengzeb, then a youth of fourteen, had urged his horse quite near to the fighting elephants, the beast singled him out for attack in default of his fleeing opponent. Nothing daunted and forcing his trembling steed to stand still, the young prince hurled a spear at the oncoming elephant. Of course this failed to check its onset, and with one thrust of its sharp tusks it dashed Aurengzeb's mount to the ground. Still fearless, the prince rose quickly and drew his sword, but fortunately for him assistance was at hand, and he was rescued. When reproached later by his father for his foolhardiness he replied: "If the fight had ended fatally for me it would not have been a matter of shame. Death drops the curtain even over emperors; it is no dishonour. The shame lay in what my brothers did"†—meaning that they ought not to have interfered to save him. This incident occurred on May 28, 1633. One of Shah Jehan's most valued elephants had been yielded to him by the

*"Les six voyages de Jean Baptiste Tavernier," Paris, 1678-9, Vol. II, p. 199, *Voyages des Indes*, Liv. I, chap. xviii.

†Jadunath Sarkar, "History of Aurengzeb," Calcutta, 1912, Vol. I, pp. 9-12.

King of Golconda. As an indication of its preëminent qualities it had been named Gajmati, or "The Pearl among Elephants"; it was esteemed to be worth one lakh of rupees (100,000) or \$50,000.*

In a battle between the armies of the King of Pegu and the King of Ava, the former gained a decisive victory, and killed his adversary in a personal encounter. Both sovereigns were mounted on elephants, and the animal that had borne the King of Ava was captured by his victorious opponent and led away to the camp. Its grief for the loss of its master was so keen that for fifteen days it refused all nourishment, and was only finally induced to break its fast by dint of much petting and coaxing. The King of Pegu's elephant had been killed under him in the battle, and the monarch ordered that sacred images should be made from the tusks, and had these idols set up in the temples alongside of those of gold and silver, as equally valuable.†

That the popular estimates of the number of war elephants maintained by Eastern potentates was often very much exaggerated is corroborated by the French traveller and gem dealer Tavernier. Having been repeatedly told that the emperor, Aurengzeb, had three or four thousand such elephants, Tavernier took pains to secure exact information in the matter, and finally learned that while he kept some five hundred as beasts of burden to carry his harem and the tents and other baggage of his household, the number of war elephants did not exceed eighty or ninety. Of these the fiercest and bravest was a great favourite and was especially entrusted to the care of the emperor's eldest son.

Tavernier also describes an interesting feature of the great birthday festival of the Mogul, in which his favourite

*Jadunath Sarkar, "History of Aurengzeb," Calcutta, 1912, Vol. I, p. 49.

†Franciscus Erasmus, "Ost-und West Indischer wie auch Sinesischer Lust-und Stats-Garten," Nüremberg, 1668, p. 1528.

elephants played a part. This is Englished by Phillips, as follows:*

“About an hour after the King has been sitting upon his Throne, seven stout Elephants bred up for War are brought out. One of these Elephants has his seat fix’d upon his back, if the King should have a mind to ride out. The others are cover’d with cloaths richly embroider’d, with chains of Gold and Silver about their Necks; and there are four that carry the King’s Standard upon their Cruppers, fasten’d to a Half-Pike, which a man, seated on purpose close by, holds upright with his hand. These Elephants are brought within fifty paces of the Throne, and when they come before the King, they make their obeysances to him, laying their Trunks to the ground, and then lifting them up above their Heads three times; every time he makes a great cry, and then turning his back to the King, one of the Leaders turns up the cloath, that the King may see he is in good case. There belongs also to every one a cord, which is put round his body, to show how much he is grown since the last year. The first of these Elephants, which the King most esteems, is a great furious creature, that has five hundred Roupies allowed him every month. He is fed with good Victuals, and a great quantity of Sucre, and they give him *Aqua-vitæ* to drink.”

The gift of an “elephant of state,” one worthy by its physical perfection and gorgeous trappings of bearing a sovereign in royal processions and progresses, has ever been regarded by Oriental potentates as a most valuable testimonial. Therefore, in 1877, when the Government of India wished to make an appropriate and acceptable present to the Shah of Persia, a State elephant was considered to be the best choice. The important matter of suitable equipment

*“The Six Travels of John Baptista Tavernier”; made English by J. P., London, 1684, Pt. II, p. 123.

was entrusted to the care of the Commissary General of the Eastern Bengal Circle, who, guided by his experience in such affairs, decided to have the trappings made in Jeypore, where some of the most elaborate work of this kind had been successfully accomplished. At the outset, however, some doubts were felt as to whether Hindu workmen would consent to execute work destined for and appropriate to a Mohammed-



IVORY DECORATION of a howdah belonging to his Highness the Maharajah of Benares. Indian art; Lahore, India.

—From *The Journal of Indian Art and Industry*.

dan sovereign, but as it appeared that there was little or no difference between the forms and designs for such work usual in Jeypore and those common in Persia, these doubts proved unfounded. The substitution of the figure of a sun rising behind a lion for the solar emblem used in Jeypore to denote that the ruler of the land belonged to the Solar Line of Rajputs was the only modification necessary. The work was done in the workshops attached to the palace of the Maharajah, and the result was brilliant enough to satisfy or even exceed all expectations.

Superstitious Hindus believe that the diseases of elephants

are the work of malignant spirits, just as they fancy it to be the case with human diseases. There is a popular native treatise on this subject, with many curious illustrations, of which Colonel Hendley writes as follows:*

“Rheumatism is represented by four small animals like rats biting the elephant’s legs; headache by a huge monster with four heads gnawing the forehead; and, in inflammatory affections of the chest and abdomen, tearing and holding on to these important sections of the body. The monster in a case of pleurisy has his huge scaly tail thrown round the chest of his victim. In a case of fever, four lighted ghostly fires surround the poor beast. A deadly cobra is twisted round the body of another tortured individual. A tiger-headed creature sprawls along the back of another victim. Lastly, a bad attack of colic is caused by the tight folds of a long serpent.”

Although because of its huge proportions an elephant always makes a striking impression upon the beholder, this impression is certainly not one of beauty or grace, but rather of power and strength. And yet, when decked out with all the gorgeous caparisons which Hindu luxury has evolved for this animal in the course of centuries, the splendour of its appearance is such that one is fairly overwhelmed by the sight. This is more especially the case when, as at the Durbars, neither expense nor pains are spared by the Hindu potentates to unfold before the wondering eyes of European visitors the full extent of their wealth in objects of adornment and luxury. The effect produced at such times upon qualified judges of things artistic is shown in the following impassioned words used by Mortimer Menpes in chronicling the happenings of the Durbar of 1903, on the

*Col. T. H. Hendley, “The Elephant in State Ceremonies,” in *Journal of Indian Art and Industry*, Vol. XVI, new series, pp. 19, 20; No. 123, July, 1913. See also No. 123, Plate I, Figs. d, e.

occasion of Lord Curzon's assumption of the dignity of viceroy:*

"How shall I describe the retinue of elephants? I tear my hair, and think, and think, until I feel I must go mad. I see it all so clearly—can I not coin words? Can I not dip my pen in purple and gold? It was almost like looking at the sun. Yellow specks danced in front of one's eyes—one had to turn away into the gray courtyard, and lose an elephant or two, to get relief. You could not see the procession in a continuous way as a whole because of the blinding colour. An elephant would pass covered with cloth of gold and ropes of pearls. 'This is the finest of all,' you would say; 'colour has gone as far as it can go.' Then suddenly another marvellous combination would spring upon you: a group of elephants in gold, emerald green, and jewels, looking like bubbles ready to burst with brilliance, and making the surrounding colours faded and paler by comparison."

'A recent traveller in India and the contiguous lands has communicated from personal experience some interesting notes on the intelligence and peculiarities of elephants. A striking proof of their thoughtfulness is the fact that they always take every possible precaution to avoid striking the howdah, or saddle, which they bear, against any obstruction, even stopping to remove this when necessary. On one occasion mentioned by the traveller, a tree eight inches in diameter had fallen across the path against the trees on the opposite side, so as to leave ample room for the elephant itself to pass beneath but not enough for the passage of the howdah. The animal was quickly conscious of this, and checking its advance, thrust the tree out of the way with its trunk so that the howdah could pass without impediment. Similar care was taken in the many narrow pathways which had to be traversed through the jungle. This evinces the

*Mortimer Menpes, "The Durbar," London, 1903, pp. 46, 47.

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comparatively high degree of intelligence, of which there are many well-authenticated examples serving to confut



THE ELEPHANT. Here the elephant is termed the mildest and most easily domesticated of all animals.

—From Johannis de Cuba "Ortus Sanitatis," Strassburg, 1483. Author's Library.

the opinion expressed by some authorities that the elephant has but little brain power.

Another instance, in itself somewhat trivial, shows that this animal possesses in a rudimentary form a faculty for extending the action of his natural powers by the aid of external objects, for we are told that when tormented by flies an elephant will break off a leafy branch with its trunk and make use of it to brush away the importunate flies. We might almost be tempted to see in this an indication of the first feeble steps taken by the hypothetical *homo alalus* in his progress toward the use of tools.

The playfulness of a baby elephant is quite suggestive of the somewhat disconcerting pranks of a romping child. The traveller was warned not to pass it without being provided with a stone or a club, for if this precaution were not taken the little fellow—of an elephantine littleness—would be sure as soon as the victim's back was turned to make a rush at him from behind and knock him over.

An anecdote, supposed to show that the elephant has a keen sense of justice, is told of one kept in the Royal Menagerie at Versailles in the eighteenth century. An animal painter wished to make a particularly lifelike picture of this elephant, and hence wanted to have the animal pose with trunk uplifted and wide-open mouth. As may be readily imagined this was no easy matter, but as an expedient the painter directed his attendant to throw apples continuously to the elephant, so that in order to catch them the desired pose would be maintained. This the attendant proceeded to do, but he did not think it necessary always to make an actual throw, often contenting himself with simply going through the motions. Exasperated at the repeated disappointments, the elephant sought revenge for the trick; not, however, on the attendant, but on the painter who was the real cause of the offence, and filling its trunk with water, the animal squirted this over the half-finished sketch, destroying it completely.*

*Johann August Donndorf, "Natur und Kunst," Leipzig, 1790, Vol. II, pp. 102, 103.

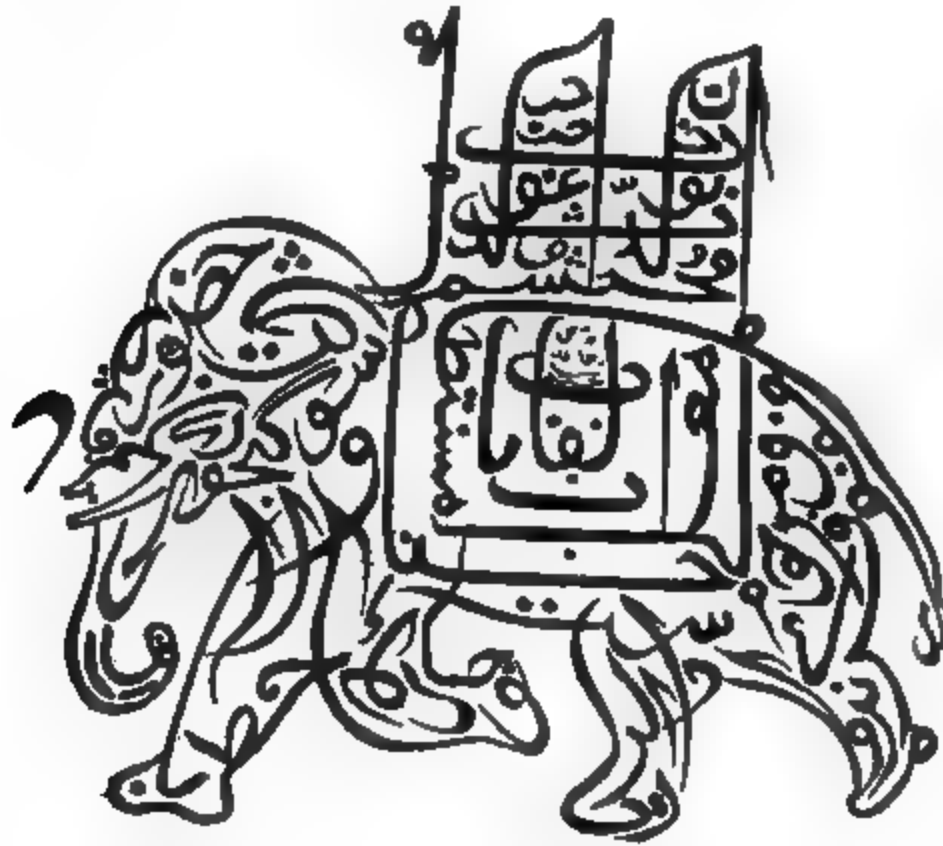
The idea that the life of each individual is bound up with that of some particular animal is quite prevalent among certain natives of the African continent. Thus, in the Cross River valley, a part of the German Cameroons, the natives identify themselves so absolutely with animals such as the hippopotamus or the elephant, and even with gazelles, fish, or serpents, that the death of the animal twin brother or twin sister entails the decease of the human subject, and should the animal be wounded the human being is supposed to fall ill in consequence. There also exists a belief that the animal double will take up the quarrels of its human associate, and will avenge the latter upon his enemies. As a general rule the natives are very chary of hunting or killing animals of a class with some of whose members they themselves or their friends may stand in such an exceedingly intimate relation, but in the case of the elephant hunters the temptation of gain overcomes or at least minimizes the effects of this curious superstition, and they excuse themselves by the assertion that they are able to distinguish those elephants whose life is bound up with that of some human being from those who are purely and simply animals. Indeed, according to some native tales, the elephant itself gives warning to the hunter of its special character by holding up one of its feet in a deprecatory attitude.*

4 The tenacious memory of elephants for injuries done them has often been proved, but there is also evidence that they are not forgetful of benefits they may have received. As an example we give the anecdote of a happening at Aji-meer in 1616, related on the authority of an English merchant of good repute, who had first-hand knowledge of the fact. The details are as follows:†

*J. G. Frazer, "Balder the Beautiful," London, 1913, Vol. II, pp. 202, 203.

†Edward Terry, "Relation of a Voyage in India in 1616," in Kerr's Collection of Voyages and Travels, Edinburgh, 1824, Vol. IX, p. 395.

A certain elephant used often to pass through the bazaar, or market place, where a woman who there sold herbs used to give him a handful as he passed her stall. This elephant afterward went mad, and, having broken his fetters, took his way furiously through the market place, whence all the people fled as quickly as possible to get out of his way.



ELEPHANT FIGURE formed by a combination of Arabic letters.
Example of the so-called "tugra" designs.
—From *The Journal of Indian Art and Industry*, 1914.

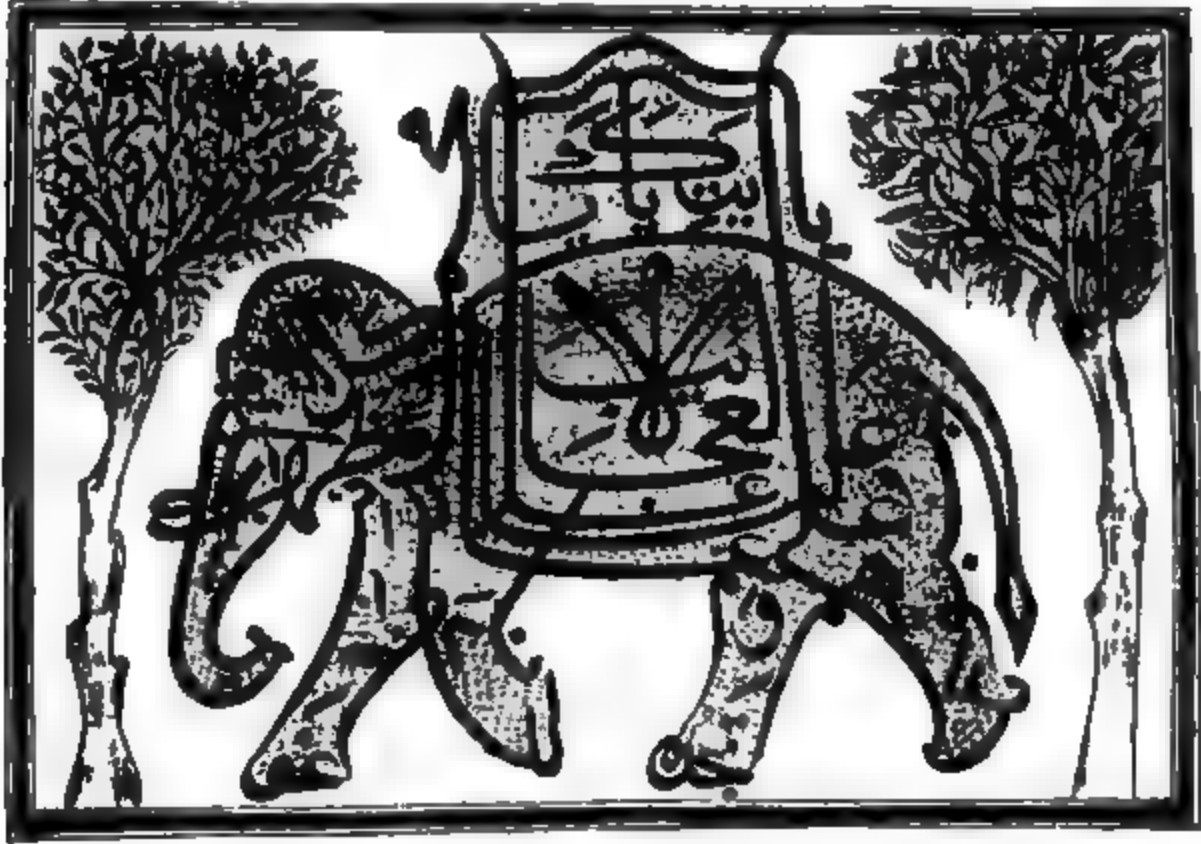
Among these was his old friend, the herb woman, who, in her haste and terror, forgot to take away her little child. On coming to the place where this woman used to sit, the elephant stopped, and seeing the child among the herbs he took it up gently in his trunk and laid it carefully in a stall under the projecting roof of a house hard by, without doing it the smallest injury, and then continued his furious course.

The same writer relates as a proof of the wonderful con-

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trol exercised over their charges by the keepers that when ordered to use the elephant for the execution of a capital sentence upon a malefactor, they can influence the animal to crush out the victim's life instantly or to break his limbs successively, as men were broken on the wheel.

The elephant outlines shown in the accompanying illus-



SPECIMEN OF HINDU "TUGRA" DESIGN, the elephant figure being formed of a combination of Arabic characters, the whole constituting a laudatory inscription.

trations are entirely formed from letters of the Persian alphabet, essentially the same as the Arabic. Designs of this peculiar, monogrammatic type are known as *tugras*, the name signifying ornamental writing made up of a number of letters. Of Arabic origin, the *tugra* (or *tughra*) was adapted to Persian use by a famous Persian calligrapher of Delhi, Amir Punja Kash. A master in Arabic monograms of this highly developed type was Munshi Zamir Ali, of Jaipur. The letters are so curiously entangled and intertwined that,

without a previous knowledge of what they signify, the task of reading them would be no easy one, as is exemplified in the well-known sign manual of the sultans of Turkey, to be seen on Turkish coins, public documents, etc., for this also is a *tugra*, although it does not make a picture.

Of our specimens, one offers the letters of the sacred text which bears the name "Nad-i-Ali" and reads as follows: "Address Ali who is the source of all manifestations of wonder. You will find him a helper for yourself in distress. Anxieties and sorrows will vanish in the immediate future, Oh, Mohammed! by reason of your being a Nabi [Prophet] and Oh, Ali! by reason of your Valayet [proximity to God]." The other example gives the name and titles of the Nawab of Juora: "Jahab Mustatab Mualla Alqab Vala Khitab Hazur Faiz Ganjur Muhatshim ud Daula Nawab Gaus Mohammed Khan Sahib Bahadur Shaukat Jung Firman-rabai Darul Riyasat Jaora Nahum wa Maqfur."*

A Hindu bazaar picture "with a moral" depicts an elephant in the act of pulling down a banyan tree; hanging on to cords passing over a branch of the tree is a man, who is seeking to seize with his mouth a clump of pendent honey, typifying the sensual pleasures of life. Meanwhile two mice, one white and one black, are gnawing at the supporting cords, and when these give way the man will be precipitated into a pit wherein four serpents, symbols of Avarice, Senselessness, Desire, and Anger are eagerly awaiting an opportunity to destroy him. The banyan tree itself represents Life, the elephant, Death, and the two mice, Day and Night. Of a slightly different version of this picture, Sir Edwin

*Chaubey Bisvesvar Nath, "Calligraphy," with an introduction and notes by Col. T. H. Hendley, in the *Journal of Indian Art and Industry*, Vol. XVI, new Series, No. 124, October, 1918; our illustrations are from Pl. 9, No. 1, and Pl. 12, No. 19.

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Arnold wrote some verses of which we may quote the four following lines:*

Shall I interpret? Life's the banyan tree;
Which Death, the elephant, in dust would lay;
And the poor foolish ape is Man; and see!
The black rat is the Night, the white the Day.

Fantastic composite animal figures, frequently composed of a number of quite unrelated forms, are favourite subjects with Hindu artists. As examples of the application of this style of drawing to the elephant may be noted two figures of compound elephants, composed of a curious medley of human and animal forms. As mahouts serve two animal-headed demons, who are urging on their mounts to combat.† Another of these curious designs shows us the god Krishna mounted on an elephant figure made up of an aggregate of male and female musicians.‡

A quaintly humorous bit of Hindu drawing is intended to illustrate the tremendous lifting power of the fabulous bird known in the East as the "roc," which was used as a symbol of strength in India. The design shows the fabled bird lifting by main force an elephant which it has seized with its mighty beak. This elephant is treated in a distinctly whimsical way, for it balances on its trunk a tiny elephant, and another on the tip of its tail; a third is held in its mouth, and below each of its feet is a similar baby elephant. As a possible help to the roc in case of need, or to the elephant itself should the bird be tempted to drop the heavy burden,

*Col. T. H. Hendley, "Indian Animals, True and False, in Art, Religion," etc.; the *Journal of Indian Art and Industry*, Vol. XVI, No. 126, April, 1914, Pl. XII, Fig. b, see p. 75.

†T. H. Hendley, "Indian Animals, True and False, in Art, Religion," etc., the *Journal of Indian Art and Industry*, Vol. XVI, No. 126, April, 1914, Pl. III, Fig. b.

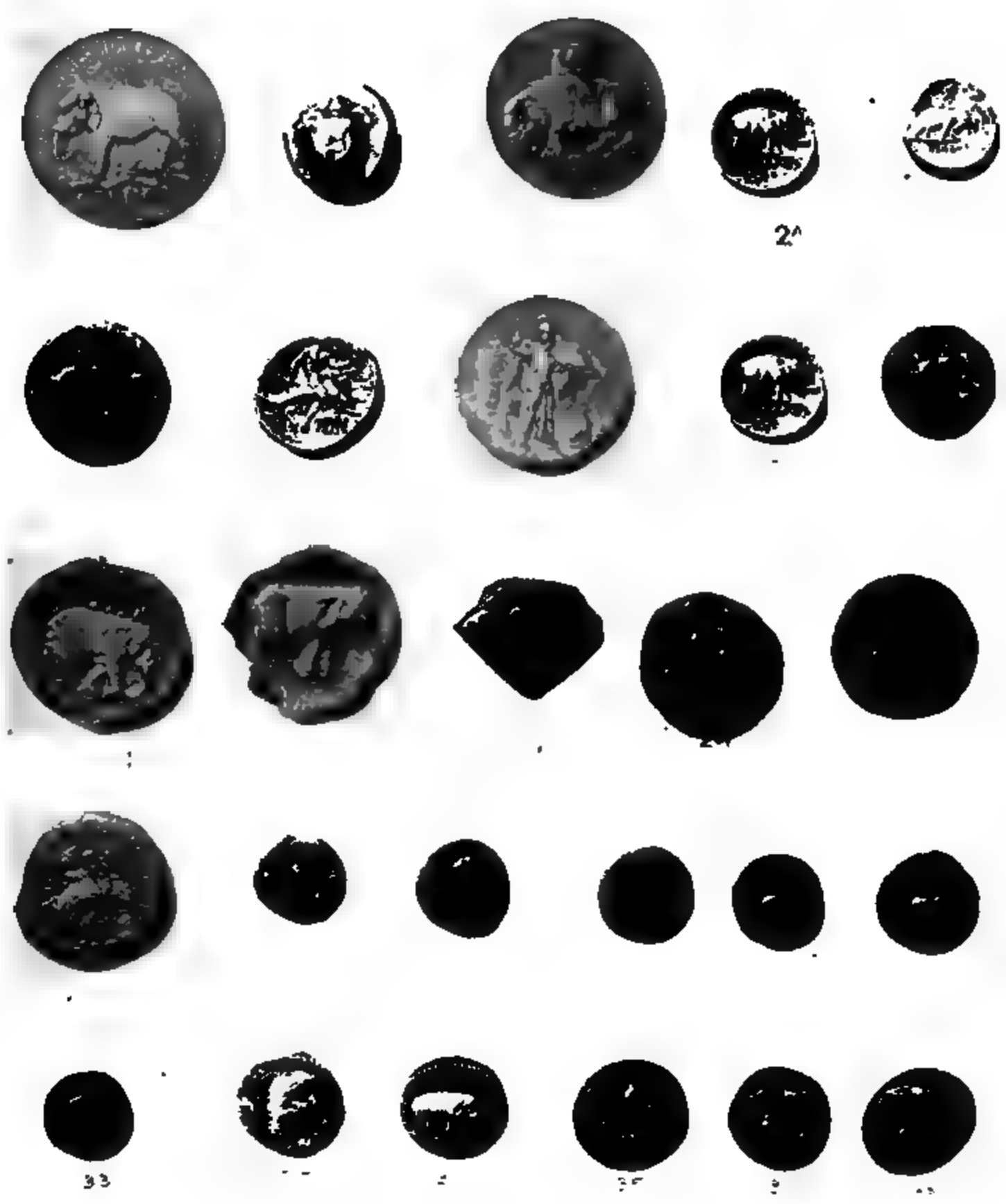
‡Ibid., Pl. VII, b.



COMBAT BETWEEN TWO COMPOSITE ELEPHANTS GUIDED BY DEMONS

DRAWN BY HINDI ARTIST

FROM THE JOURNAL OF INDIAN ART AND INDUSTRY, VOL. XVI



TYPES OF ELEPHANT COINS
GREEK, ROMAN, AND MODERN

the artist has provided the elephant with a small pair of wings.*

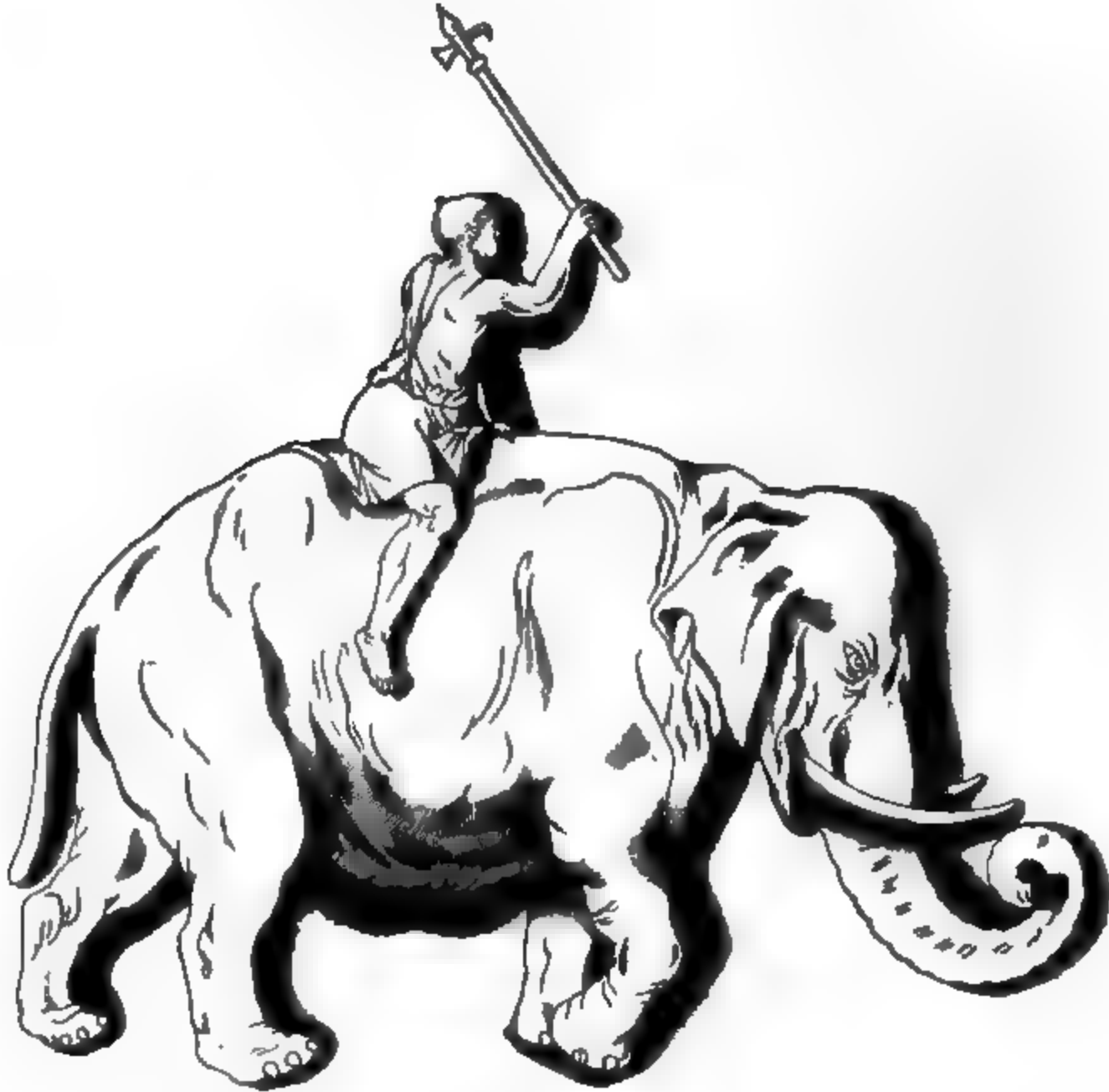
A work that is altogether *sui generis* is that written by Gisbertus Cuperus (Gisbert Kuypert, 1644–1716), a native of Hemmerdenn, in the Low Countries, on the coins bearing representations of the elephant.† It was first published at The Hague, in 1719, three years after the author's death, being edited from manuscript that he had left. This splendid folio is embellished with one hundred and twenty-six finely executed cuts of coins and medals with elephant figures, or illustrating these, and also with two large cuts, one showing the sculptured elephant surmounting the Triumphal Column of Emperor Arcadius in Constantinople, and the other representing the Egyptian Obelisk set up by Pope Alexander VII in the Forum Minerva, Rome, the obelisk itself resting on an elephant base. All these are text illustrations, added to which is a folding plate giving the image of a Hindu god with an elephant head, which had been taken by Christians from a Hindu temple. This god is, of course, Ganesa, an embodiment of wisdom in the Hindu pantheon. The text, besides offering as full an account as was possible of the coins themselves, communicates in a discursive manner a great deal of valuable information as to the introduction of elephants into the Græco-Roman world, after Alexander's conquests, and also as to their use in the combats of the arena at Rome and elsewhere, in war, in triumphal processions, etc. The writer, who was a member of the French Académie des Inscriptions et Belles-Lettres, shows himself in this work to have been a man of sound judgment and of wide reading. He

*Col. T. H. Hendley, "Indian Animals, True and False, in Art, Religion," etc., the *Journal of Indian Art and Industry*, Vol. XVI, N. S., No. 126, April, 1914, Pl. I, Fig. a.

†Gisberti Cuperi, "De elephantis in nummis obviis," Hagæ Comitum, 1719, [4]+142 pp. (284 cols.), folio.

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was for many years professor of Greek and Latin at Deventer, and after his death a eulogy on him was delivered by M. Bozé at a meeting of the Academy of Inscriptions, which is published in the third volume of its *Mémoires*.



ELEPHANT WITH MAHOUT on triumphal arch of Arcadius in Constantinople, after the "*Antiquitates Constantinopolitane*" of Bandurius.

—From Kuyper's "*De elephantis in nummis obviis*," *Hagæ Comitum*, 1719.

Of the second period of Greek coinage, 550 to 480 B. C., there is a silver coin of the island of Aegina (Fig. 1), the characteristic tortoise emblem having an elephant's head stamped upon the back, this being possibly a later addition. Some of the finest representations of the elephant may be

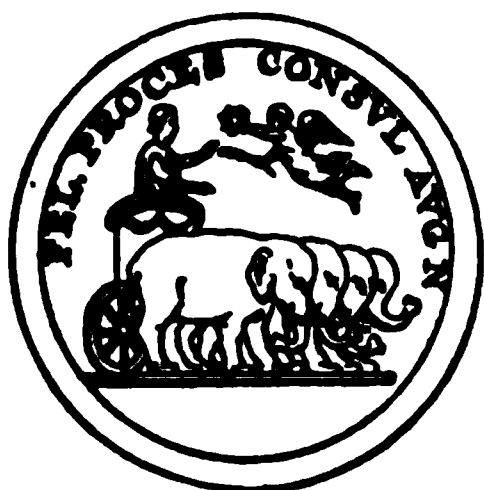


FIGURE OF GANESA THE ELEPHANT-HEADED HINDU DIVINITY, from an image taken out of an Indian temple by Christians in the seventeenth century.

—From Kuyper's "*De elephantis in nummis obviis*," Hage Comitum, 1719.*

***In the Collection of the American Numismatic Society, New York.**

seen on Syrian coins, as for instance on a drachma of Antiochus III (Fig. 2) where there appears a remarkably bold and well-executed elephant, with fine long tusks. A rude production of North African silver coinage, from the time of Juba I, King of Numidia (60-46 B. C.), gives a curiously archaic portrayal of an elephant in motion (Fig. 7). On the other hand, the elephant in repose is effectively figured on an Etruscan copper coin (Fig. 21), and a specimen of the copper coinage of Juba I (Fig. 22) offers an exceedingly life-



MEDAL OF MAXENTIVS, depicting the emperor standing in a car drawn by four elephants and receiving a crown and palm branch borne to him through the air by a winged victory.

like elephant type, in marked contrast with the archaic silver coin noted above, which may have been intended to reproduce old Punic models.

A number of types of coins bearing representations of the elephant are inscribed with the name of Julius Cæsar; on some of these Cæsar's head is stamped on the obverse, while on others only the letters of his name appear. The French critic Joubert hazarded the conjecture that certain at least of this latter type were struck while Cæsar, still a private citizen, could not have his image on the coins, and that as in the Mauritanian tongue the name of the elephant was *cæsar*, this animal's figure served as a kind of hieroglyph or rebus. There may perhaps be some truth in this conjecture, and the frequent appearance of the elephant on coins of the later Cæsars might be explained as at once due to the free use of this form on Julius Cæsar's coins, and to the assimilation of the Mauritanian *cæsar* (elephant) with the name of the greatest and most ambitious of the Romans, a name that since his time has been the favourite designation of imperial dignity.*

*Gisberti Cuperi, "De elephantis in nummis obviis," Hagæ Comitum, 1719, col. 163; citing Joubert's "De la science des médailles," Chap. V.

A fine coin of Seleucus I (312–280 B. C.; Fig. 3) shows a chariot drawn by four elephants, to whose necks are attached upright sceptres. The anchor figured on this coin was the chosen emblem of the Seleucidæ. There are also many splendid examples of elephant coins bearing on one side the name Quintus Cæcilius Metellus Pius and frequently on the other side the inscription Scipio Imp. The elephant type appears on many coins of the Gens Cæcilia, and this is believed to be due to the brilliant victories gained by Lucius Metellus over the Carthaginians in the First Punic War, when war elephants were used in the Carthaginian armies in Sicily and Africa. Lucius Metellus is stated to have brought some of the captured elephants from Sicily to Rome.*

COINS WITH ELEPHANT TYPES

SILVER

Stater of Aegina, 550 to 480 B. C.; tortoise stamped with elephant's head.

Antiochus III. Drachma. Reverse, elephant.

Seleucus I. Drachma. Reverse, quadriga of elephants.

Coin of Trajan, struck in Alexandria.

Tarentum, 473–400 B. C. Reverse, Taras on dolphin; elephant symbol.

Egyptian coin of Alexander IV of Macedon (this is the *reverse*, the elephant type occurs as headdress of head on obverse).

Juba I of Numidia, 60–46 B. C.

COPPER

Seleucus I, 312–280 B. C. Reverse.

Etruria. Reverse.

Juba I, of Numidia, 60–46 B. C.

Bactria, Heliodes, aft. 169 B. C.

Bactria, Hiverkes, 120 A. D.

Parthia. Mithridates III, 60–56, B. C.

*Gisberti Cuperi, "De elephantis in nummis obviis," Hagæ Comitum, 1719, cols. 62, 118.

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DENarii

Lucius Roscius Fabatus. Head of Juno Sospitæ; below forepart of elephant.

Cæcilius Metellus Pius Scipio Imperator. Reverse.

Q. Cæcilius Metellus Pius. Reverse.

Julius Cæsar. Reverse.

Augustus. Reverse, biga of elephants.

COPPER

Titus. Reverse.

Philip I. Reverse, elephant with rider.

FIRST BRONZE

Tiberius. Obverse, emperor driving quadriga of elephants.

Philip I. Reverse, elephant with rider.

FOREIGN GOLD, SILVER, AND COPPER

Transylvania, Sigismund Bathori, 1592. Crown. Reverse, shield with three elephant tusks.

Hesse-Hanau. William, 1771. Crown. Reverse, in exergue, an elephant (Mint-mark?).

Denmark. Frederick IV, 1725. Beneath royal arms is an elephant.

Uncertain German State, 1697. Schaupfennig. Reverse, elephant adoring the sun.

England, Charles II. Gold Double Guinea. Obverse, elephant emblem of newly founded Guinea Company, under bust of king.

England, Charles II. Crown. Obverse, elephant beneath king's bust.

England, James II. Gold Guinea. Obverse, elephant beneath king's bust.

England, William and Mary, 1689, Gold Guinea. Obverse, elephant beneath royal busts.

Free Trade to Africa by Act of Parliament, 1750. Obverse, crest of arms, elephant and castle. Gilt proof.

Afghanistan. Coppers with rude figures of elephants.

Georgia. Struck for Erivan. Copper. Elephant and Sun. Two examples.

Mysore XL. Cash. Copper. Elephant carrying banner.

Mysore XX and X. Cash. Copper.

FOREIGN GOLD, SILVER, AND COPPER—*Continued*

◀Ceylon, 1802. Copper. Obverse.

◀Ceylon, 1812. Copper. Obverse.

Siam. Three-pagoda-piece. Gold. Obverse.

Siam. One Tical. Silver.

◀Coventry, 1792. Half-penny. Reverse, elephant and castle (arms of Coventry).

◀God Preserve New England, 1694. By Bolen.

◀God Preserve Carolina and the Lords Proprietors, 1694. Struck from Bolen's dies.

A coin bearing the name "Alexander," possibly referring to Alexander II of Epirus (began to reign in 272 B. C.), son of Pyrrhus, shows a head bearing the scalp, tusks, and a part of the trunk of an elephant as a headcovering.* Of Antiochus Epiphanes, King of Syria (reigned 85 B. C.), we have a coin with a torch-bearing elephant (*lychnophoros*) on the reverse.†

On the reverse of several ancient coins appear representations of the god Bacchus, seated in a chariot drawn by four elephants, and in one instance Minerva is depicted in a similar way, but the only instance known to us where Venus so appears is furnished by a Pompeian fresco recently discovered by Professor Spinazzola on the wall of a house on the "Street of Abundance." Apart from the unusual character of this picture, it has very high artistic merit and was evidently greatly prized by the owner of the house as it was provided with glass covers to protect it from injury.

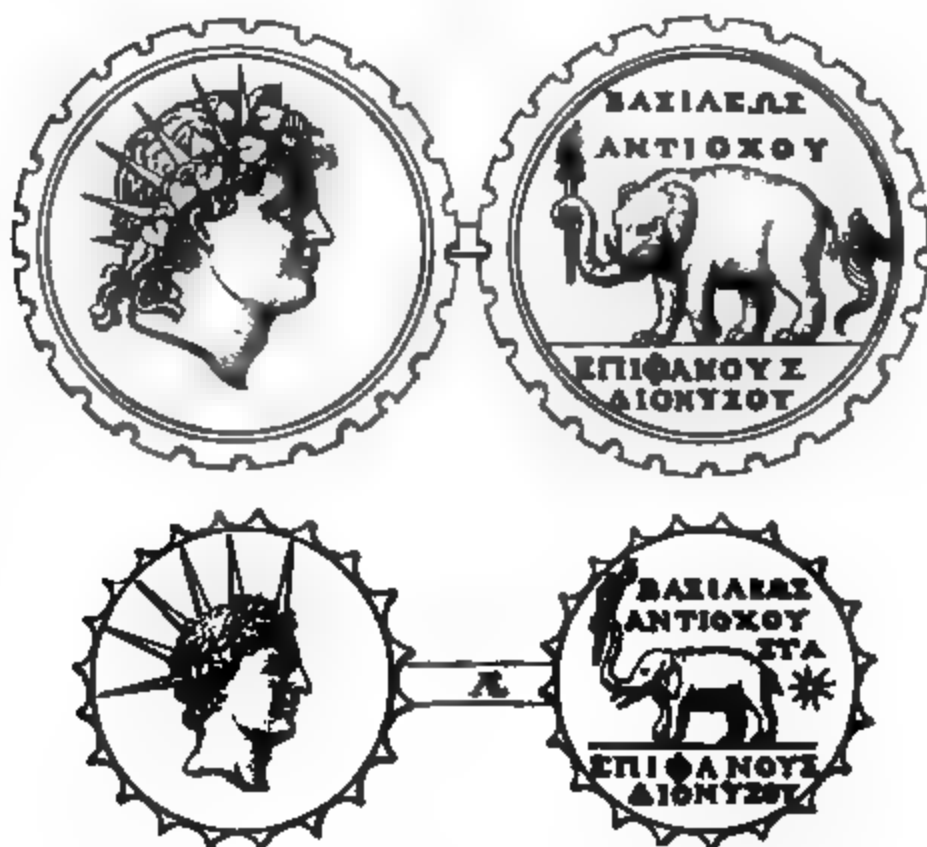
There is from Egypt a coin of one of the many Cleopatras, in this case probably the daughter of Ptolemy Philometor, by his sister, who also bore the name Cleopatra. The head

*Op. cit., p. 50.

†Op. cit., p. 74.

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on the obverse is decked with the spoils of the elephant.* Other coins appear to have been struck to celebrate the munificence of certain emperors in providing elephants for the games of the circus; specimens of these, each bearing an elephant's figure and the head of Commodus, Caracalla (188–207 A. D.), or Elagabalus (204–222 A. D.) have



1. COIN OF ANTIOCHUS EPIPHANES DIONYSUS, who reigned 85 B. C. Showing a torch-bearing elephant, *lychnophorus*.
2. Coin of the same king; different type.

—From Kuyper's "De elephantis in nummis obviis," *Hagæ Comitum*, 1719.

come down to us.† Another and especially curious type of this class of coins shows the elephant in the act of adoring the heavenly bodies. The fancy that this animal was very pious was quite common in ancient times, Pliny writing that it had a "certain religious sentiment and venerated the

*Gisberti Cuperi, "De elephantis in nummis obviis"; in Sallengre, "Novus thesaurus antiquitatum romanarum," Venetia, 1735, Vol. III, col. 58.

†Cuperi, op. cit., col. 208.

stars, sun, and moon."* Doubtless the slow and solemn elevation of the trunk toward the heavens was interpreted as an act of worship when it was observed at certain times. Two relatively modern medals show this type, one of Augustus of Saxony and his brother George I bears the legend: *Time Deum et honora regem*, "Fear God and honour the King," while the other, struck by order of Cardinal Zabarella, bears the head of that prelate on its obverse, and on the reverse an elephant with trunk uplifted toward the sky, where are seen the sun, crescent moon, and several stars, thus adequately illustrating the passage in Pliny's Natural History.†

The coin of Antiochus XII with the torch-bearing elephant on its reverse calls to mind the statement of Suetonius that at Cæsar's African triumph forty torch-bearing elephants preceded his chariot.‡ Indeed, it has often been asserted, although erroneously, that he himself was seated in a chariot drawn by elephants. It appears that some elephants were specially trained to bear torches.** An interesting "elephant coin" is the silver denarius struck to celebrate Cæsar's victory over Scipio and Juba at Thapsus in 46 B. C., which represents an African elephant crushing a serpent.§

It might be noted here that after Cæsar's assassination his body was placed upon a funeral couch of ivory.††



COIN representing Nero and his mother Agrippina in a chariot drawn by four elephants. The female figure bears the standard of a Roman legion.

—From Kuyper's "De elephantis in nummis obviis," *Hagæ Comitum*, 1719.

*Plinii, *Hist. Nat.*, Lib. VIII, cap. 1.

†Suetonii, "Vita Julii Cæsaris," cap. 37.

‡Armandi, *op. cit.*, frontispiece, Fig. 8.

†Cuperi, *op. cit.*, col. 85.

**Armandi, *op. cit.*, p. 278.

††Suetonii *Vita Julii Cæsaris*, cap. 84.

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On the reverse of many imperial Roman coins appears a biga or quadriga drawn by two or four elephants, or else a kind of car; in each case the figure of the emperor is seen, standing or seated, in the vehicle. This sometimes refers to a triumph, and the emperor himself is denoted, but often



MEDAL showing chariot drawn by four elephants and bearing statues of the late Emperor Pertinax as well as a symbolic image of Eternity.

—From Kuypert's "De elephantis in nummis obviis," *Hagæ Comitum*. 1719.

it is only his statue that is figured. On a silver coin of Caligula we see the emperor (or his statue) on a car drawn by four elephants, on each of which sits the respective mahout; the emperor's figure is surrounded by seven stars. It is believed that this refers to a golden statue of Caligula that was drawn in triumph to the Capital, while troops of noble

youths sang pæans in honour of his divinity. The stars also signify his assumption of divine honours during his lifetime.*

A few of the elephant figures stamped on the Roman imperial coins appear to be provided with a kind of chain armour, as, for instance, in the case of a gold coin of Antoninus Pius. It is, however, possible that the peculiar covering here shown was rather a network of some ornamental kind, as the meshes are so wide that we can scarcely see how they could afford efficient protection, and indeed the thickness of the elephant's hide must have shielded it from many of the weapons used in old-time warfare.†

An ancient representation of the elephant in a precious material was unearthed long since in a Roman sepulchral urn, and was preserved in the collection of Cardinal Farnese. This was a small elephant figure, skilfully carved out of a piece of amber. The fact that, as a rule, the objects placed in these urns were believed to have some religious, symbolic, or talismanic quality or virtue, suggests that here some such significance was given to this elephant carving.‡

Of the thirty or forty elephants brought by Hannibal from Africa in his invasion of Italy, a number perished in the passage of the Pyrenees and the Alps, but he still had several available for his early conflicts with the Romans, especially in the first battle at Trebia with the consul Sempronius. However, the comparatively severe climate of northern Italy proved deadly for those who had survived the exposure of the mountain transit, and a few years sufficed to strip the Carthaginian army of these spectacular auxiliaries. At Hannibal's Waterloo, the battle of Zama, fought against Scipio on African territory, after the Car-

*Gisberti Cuperi, "De elephantis in nummis obviis," *Hagæ Comitum*, 1719, col. 221.

†*Ibid.*, col. 206.

‡Nona Lebour, "Amber and Jet in Ancient Burials," reprint from *Transactions of the Dumfriesshire and Galloway Natural History and Antiquarian Society*; November 27, 1914, p. 5.

thaginian hero's recall to defend his native land, as many as eighty elephants are said to have been engaged; but Scipio prudently ordered that their onslaught on his centre should not be directly opposed, and by allowing them to pass through and closing up the ranks after their passage, he deprived the Carthaginians of any advantage they might have derived from the overwhelming attack of these ponderous beasts. On the conclusion of peace, after the defeat of Zama, Carthage was obliged to surrender all her war elephants and to engage that she would never use any of these animals in her army in the future.

In Cæsar's African campaign during the Roman Civil War his opponent Scipio and the latter's ally, King Juba, put considerable trust in the war elephants forming part of their army. As most of them had not yet received proper training, Scipio endeavoured to supply this deficiency by some rather curious exercises. After placing the animals in order of battle, he stationed in front of them a number of soldiers who were to represent the enemy. These soldiers proceeded to throw small stones at the elephants' heads, and the untrained beasts were soon put to flight; however, their rout was checked by a larger body of soldiers armed with much bigger stones, so that the bewildered elephants turned about and charged in the original direction. Perhaps the possible practical efficacy of such training may have been greater than we should at first expect, since by frequent repetitions the elephants would at last become impressed with the notion that worse effects would follow a retrograde movement than an advance. In this particular instance, however, we have the definite statement, by Cæsar himself or from his information, that not much was accomplished thereby. Indeed, he expresses the opinion that long years of training were needed to produce a war elephant, and that at best they were very uncertain auxiliaries, quite as likely to do

harm to the army of which they formed part as to the enemy.*

The thoroughness of Cæsar's military preparations, suggestive of German efficiency in the close attention to the smallest details, is illustrated in the steps he took at the outset of the African campaign in his struggle for supremacy in the Roman world. As above noted his enemies, Scipio and King Juba, regarded the war elephants of their forces as formidable assailants. Cæsar, however, put little faith in them; but, nevertheless, fully aware of the fact that his soldiers might be thrown into confusion by the onset of such unfamiliar adversaries, he took measures to familiarize them with the sight of elephants and to instruct them in the best means of putting them to flight. He therefore had a number of elephants brought to his camp, so that the aspect of the apparently dangerous beasts should no longer strike terror into the hearts of his legionaries, and that the horses of his cavalry should become accustomed to their appearance. He also provided these trial elephants with the full panoply of war and had his soldiers instructed as to the most vulnerable parts of their bodies, making them throw javelins, with blunted points, at these spots so that they might know just what to do in real battle. In the decisive conflict at Thapsus one of the legionaries displayed his natural courage, perhaps fortified by these preliminary exercises. The elephants of Scipio and Juba attacked boldly enough but were repulsed by the Romans and driven off, trampling upon the troops of their own army. In the heat of the encounter, however, one of the elephants threw down a member of Cæsar's forces and crushed the life out of him; remarking the attack, a brave Roman of the Fifth Legion hastened to give help but came too late for this. Turning from the body of its victim to this unexpected assailant, the elephant seized the legion-

*Cæsar, "De Bello Civili," cap. 28, 30.

ary with its trunk and whirled him aloft, but the soldier did not lose his presence of mind, and drawing his short, sharp sword, struck at the encircling trunk, inflicting such a painful wound that the animal released him and fled, trumpeting wildly.*

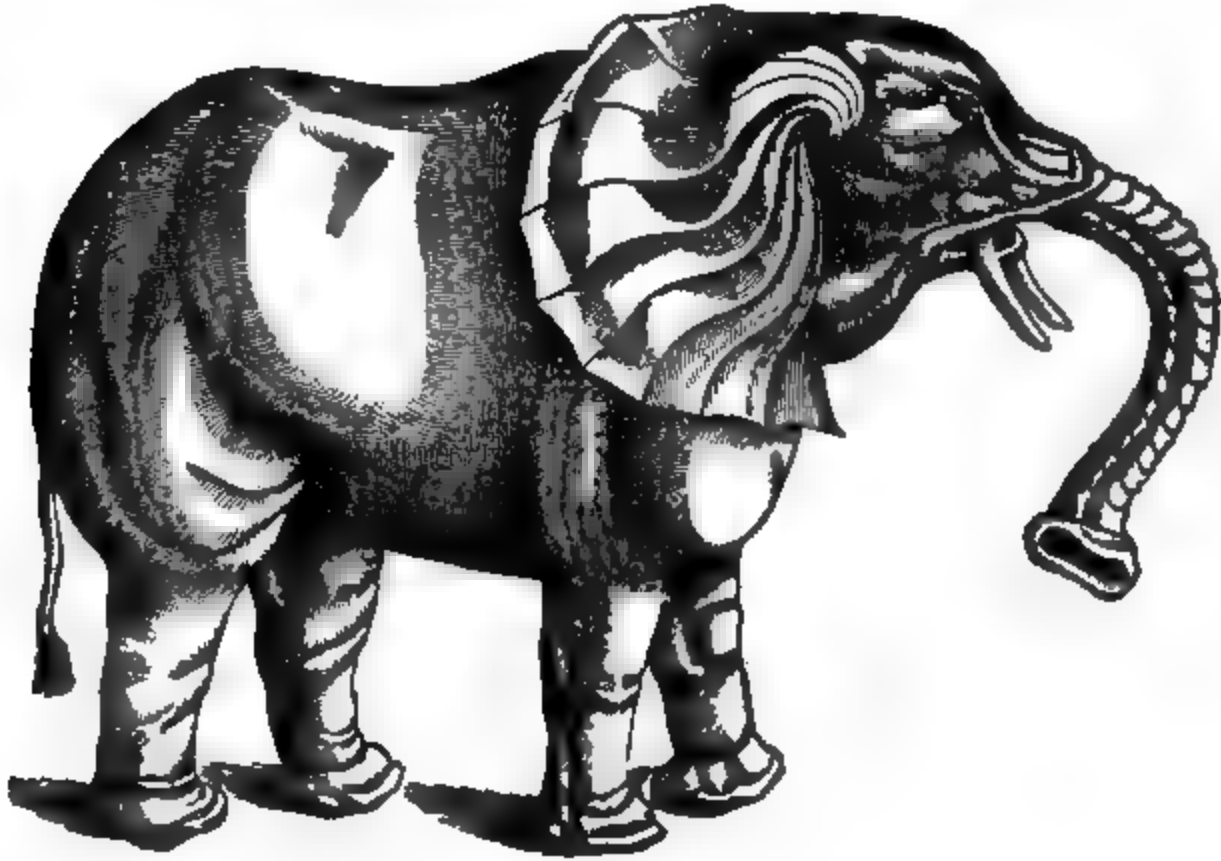
The historic city of Catania in Sicily counts as one of its greatest adornments La Fontana dell' Elefante,† a beautiful sculptural work placed in the plaza before the cathedral. The splendidly modelled figure of an elephant supports a lofty shaft, and the design suggests the elephant-borne obelisk erected in Papal Rome in the sixteenth century. The proximity of Sicily to ancient Carthage, and the Phœnician settlements on the island in the era of Carthaginian prosperity, made the elephant a familiar though dreaded figure for the Sicilian of ancient times, and the Catanian sculpture may be regarded as a distant echo of Græco-Roman tradition.

The rare and interesting old treatise "De Proprietatibus Rerum," by the English ecclesiastic, Bartolomæus Anglicus, who flourished toward the middle of the thirteenth century and was for some years a professor of theology in the famous University of Paris, the great resort of the scholars of this period, has a chapter on the elephant, in which the learned author has gathered together all the data available from the works of still older writers. From them he repeats the traditional view as to the great age to which some of these animals may attain, putting this at three centuries. Their use in war by the Medes and Persians is touched upon, and the custom of placing wooden turrets on their backs in which were stationed men-at-arms. The queer fancy that the elephant had a particular dread of the mouse is also chroni-

*Caesaria, op. cit., 83, 84, 86.

†The great Spanish Encyclopedia now being published in Barcelona figures this interesting elephant monument twice, once in the article *elefante* in Vol. XIX, p. 702, and again in the article *Catania*, Vol. XII, p. 479.

pled and brought into contrast with the courage exhibited by war elephants in charging upon the serried ranks of an enemy force. Of the kindly consideration shown by some wild elephants to wandering travellers, it is gravely stated that one of these animals would thoughtfully step out of a woodland path should he espy therein a traveller who had



WOODCUT ILLUSTRATION OF AN ELEPHANT

—From Edward Topsell's "The History of Four-footed Beasts," London, 1658.

lost his way, lest the man should be terrified by the sudden appearance of the monstrous animal. The fancied religious sentiment of elephants, exhibited by the raising and waving of their tusks at certain times, is also recited, and Bartolomæus had read that the elephants trained at the courts of Oriental potentates had been taught to recognize the sovereign and do reverence to him by bending down on their knees. This at least proves that our author possessed better sources of information than some old writers, who propagated the

strange error that the elephant's legs were jointless, so that they could not be bent.*

The old English treatise on "four-footed beasts" by Edward Topsell enlarges upon the curative value of the flesh and blood of the elephant, gleaning his information from various older authorities. As we can scarcely venture any confirmation of Topsell's assertions, it seems best to give the passage in his own words as follows:*

"The medicinal virtues in this Beast are by Authors observed to be these: The bloud of an elephant and the ashes of a Weasil cure the great Leprosie: and the same bloud is profitable against all Rheumatick fluxes, and the *Sciatica*. The flesh dryed and cold, or heavy fat and cold, is abominable; for if it be sod and steeped in Vinegar with Fennel-seed, and given to a Woman with child, it maketh her presently suffer abortion. But if a man taste thereof saltal and steeped with the seed aforesaid, it cureth an old cough. The fat is a good Antidote either by Ointment or Perfume: it cureth also the pain in the head.

"The Ivory or tooth is cold and dry in the first degree, and the whole substance thereof corroborateth the heart and helpeth conception. After a man is delivered from the lethargy, Pestilence, or sudden forgetfulness, let him be purged and take the powder of Ivory and *Hiera Russi*, drunk out of sweet water. This powder with Hony-Attick [Attic honey] taketh away the spots on the face. The powder of Ivory burnt and drunk with Goats-bloud doth wonderfully cure all the pains, and expell the little stones in the veins and bladder. Combs made of Ivory are most wholesome, the touching of the trunk cureth Headach."

*From a MS. of the "De Proprietatibus Rerum," by Bartholomæus Anglicus, dating from the end of the thirteenth or the beginning of the fourteenth century; lib. XVIII, fol. ccxxiv recto and verso fol. ccxxv recto. This valuable MS. was originally in the Carthusian monastery of the Trinity, near Dijon, France.

*Edward Topsell, "History of Four-footed Beasts," London, 1658, p. 165.

The ancient Danish decoration, the "Order of the Elephant," dates from the time of King Christian I, who is believed by many to have instituted it at his coronation in 1457. His wife, Queen Dorothea, was one of the few women who have received this decoration, which has, indeed, been so closely confined to personages of royal birth that, in 1907, out of eighty-seven members seventy-six were of royal blood and only two were Danes. For a long period after the institution of this order, the number of members was limited to fifty, and the original foundation was of a pronouncedly religious character.

As first awarded, the decoration was a chain formed of interlinked elephants, this chain supporting a larger elephant figure as pendant, often adorned with a setting of diamonds or other precious stones, the splendour and value of the insignia differing, of course, in accordance with the rank of the recipient. At a later date the order assumed a purely secular character, and at present the decoration consists of a white elephant in enamel, with a tower on its back, and bearing a royal plaque with a white cross in the centre on a red background; this may either be worn suspended from a gold chain or from a scarf or band of blue watered silk. The choice of the elephant as the emblem on this decoration was due to the traditional belief in the docility, sobriety, and even the piety of this animal.

Because of its romantic interest we must regret that the strict canons of historical criticism forbid us to accept the recital according to which this Danish order owed its origin to a feat of arms executed during the crusades. The story ran that the Order of the Elephant* was founded by King Canute IV of Denmark, in the twelfth century, to com-

*A representation of this order, showing the interlinked elephants with the pendant elephant, is given in Salmonsens's "Store Illustrerede Konversationslexikon," Kjobenhavn, 1896, Vol. V, p. 882.

memorate the valour of a Danish Crusader, who, in 1189, had slain an elephant of the Saracen hosts with which the Crusaders were fighting.

The Siamese order of the White Elephant is of quite recent institution, having been founded in 1861. The insignia consists of a plaque or medal of gold enamel, with the figure of an elephant in the centre. The order is worn suspended from a red band or scarf, on either edge of which are three stripes, the two inner ones narrow and of blue and yellow, respectively, while the outer ones are broad green stripes. This certainly offers a feast of colour sufficiently rich to satisfy any Oriental taste.

The state of semi-insanity through which many male elephants pass during a period of the year has been directly connected by some with a painful swelling of the glands just above the eyes, accompanied by a discharge. This, although perhaps a certain source of irritation in itself, is not the real cause of the trouble, but merely one of its symptoms. Just as the elephant becomes "must" as is popularly said, so do adult male elk, or round-horned deer of many kinds, develop similar excitement and viciousness at a certain season of the year.*

One of the largest elephants ever brought to the United States from Africa was received by the Cincinnati Zoological Company in 1875, when the animal was eighteen years old. His height was 9 ft. 11 in., and his weight $4\frac{1}{2}$ tons, but his tusks were not especially fine ones, for they measured only 3 ft. in length with a base diameter of 4 in. The proud name "Conqueror" was bestowed upon this elephant. Large as he was he fell far short of equalling the mighty Jumbo in size, for the latter could boast of a height of 11 ft. 10 in., and weighed $5\frac{1}{2}$ tons. When the famous showman Barnum bought him for \$10,000,

*Communicated by Director W. T. Hornaday, of the New York Zoölogical Park.



FAMOUS INDIAN ELEPHANT "GUNDA" (KILLED IN 1915)

HEIGHT AT SHOULDER 9 FEET 3 INCHES. AGED 20 YEARS

NEW YORK ZOOLOGICAL SOCIETY

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he was 23 years old, and had for some time been a great pet in London, so that, when too late, there was quite a little newspaper excitement in that city over the loss of Jumbo. Poor Jumbo, who had wandered over a good part of the United States as one of the leading attractions of Barnum and Bailey's circus, met his death by being crushed between two railroad cars in a desperate attempt to save a baby elephant from being run over. The Zoölogical Company has owned at various times a number of fine elephants; one of these called "Chief" weighed nearly as much as Jumbo for he tipped the beam at 5 tons. He was 9 ft. 2 in. in height and had tusks 4 ft. 5 in. long, the diameter being $4\frac{1}{2}$ in. Unfortunately, this elephant was credited with having caused the death of 11 men in the circus to which he had belonged, and became so vicious that he had to be killed. He had cost \$5,000. As a specimen of the Asiatic elephant, the company now owns a female called "Lill," who though but 8 ft. 8 in. tall, and 60 years old, is very powerful and has been used to move water mains weighing from 500 to 600 pounds. Should a heavily loaded wagon become stalled in entering the Zoölogical Garden, "Lill" is called upon to relieve the situation and will quietly put her trunk under the hind axle, tip the wagon up a little, and then push it on with her head.*

While Jumbo is considered to have been the tallest elephant ever brought from Africa, many elephant hunters claim to have seen still taller ones among the wild elephants they have encountered. This may be true, nevertheless the fact that of those that have been shot and measured none so far seem to have exceeded Jumbo in height might

*Communicated by S. A. Stephan, General Manager, Cincinnati Zoölogical Company. This informant notes that African elephants are much more excitable and flighty than those of Asia.

be considered to render it somewhat doubtful. Among others, Mr. James Barnes, of New York City, avers that he has seen at least two bulls 4 or 5 in. higher at the shoulder than Jumbo, and hence over 12 ft. high, and which probably weighed half a ton more than he did, for he was always very gaunt and thin compared to a wild elephant.

The rival circus show of Barnum and Bailey, the Forepaugh show, owned a champion Cinghalese elephant named "Bolivar." He measured 9 ft. 8 in. in height, and hence was considerably shorter than his great competitor Jumbo, but he was more massive and was thought to be heavier than the latter. Even when much reduced in weight by illness or moping he tipped the scales at 8,700 pounds, but after Adam Forepaugh had presented him to the Zoölogical Society of Philadelphia, feeling that his circus career was about ended, the change of scene and absence of annoyance improved the animal's health so greatly that he rapidly took on flesh, and although he was never officially weighed, good judges placed his weight at from 10,000 to 12,000 pounds. "Bolivar" lived twenty years in this country, dying July 31, 1908.*

It is claimed by Colonel Roosevelt that the young of elephants are for a long period defenceless creatures and that many of them are killed by lions, but once an elephant has attained its full growth, its immense bulk and the protection afforded by tusks and trunk render it practically immune from attacks of other animals, even against the lion, rhinoceros, etc. Moreover, the young are in most cases more or less effectually protected by the older animals. This can, therefore, hardly be adduced as a satisfactory explanation of the comparatively small number of these

*Communicated by Mr. Robert D. Carson, Superintendent of the Zoölogical Society of Philadelphia.

animals in interior Africa. The suggestion has been made by some, without however much proof, that elephants may be subject to some particular disease that carries off many of them from time to time. In any case, when we consider that under favourable conditions an age of one hundred years is not believed to be at all unusual, this limit being not seldom exceeded, even though the total offspring of a cow elephant may not number more than four or five in a lifetime, the *a priori* likelihood of larger numbers seems apparent. An argument in favour of some degenerating disease has been found in the fact that the female Asiatic elephants are almost all tuskless, and that the males themselves rarely show tusks surpassing 35 to 50 pounds in weight.

The National Zoölogical Park in Washington, D. C., owns, as a gift from the Adam Forepaugh show, an elephant of great size though not of exceptional height. This is a male of the Indian species and has been named "Dunk." The height taken at the shoulder is 8 ft. 8 in., but the weight has been estimated at 11,000 pounds. It is supposed to be about fifty years old. As is the case with many Indian elephants "Dunk" is tuskless.

As to the longevity of the elephant we have the statement in a memorandum made by Colonel Robertson, who commanded part of the British troops in Ceylon, in 1799, not long after the island had been captured from the Dutch by the British, that there was at that time in the elephant stables at Matura a decoy elephant which the records proved had been taken from the Portuguese by the Dutch in 1656, and which had served his new masters for 140 years; at the expiration of this period it fell into the hands of the British.*

*Sir J. Emerson Tennent, "Sketches of the Natural History of Ceylon, including a monograph on the Elephant," London, 1861, p. 233.

CHAPTER V

ELEPHANT HUNTING, ETC.

THE record of a great elephant hunt of the Egyptian King Thothmes III (c. 1501–1447 B. C.) is inscribed upon the walls of the tomb of his scribe Amen-em-heb, in the Theban Necropolis. The various translations differ in some minor points but agree essentially. The following is the rendering of a recent German version:*

“Again I saw another glorious deed accomplished by the Lord of the Two Lands, in Niy. He hunted one hundred and twenty elephants because of their tusks. I encountered the largest of them, when he was charging against His Majesty. I lopped off his trunk [lit. “his hand”] while he still lived, before the King, while I stood in the water between the rocks. Upon this my Lord rewarded me with gold . . . and with three changes of raiment.”

That Assyrian monarchs also hunted the elephant is shown in an inscription of Tiglath Pileser I (c. 1100 B. C.), which was found at the ruins of Kalat Sherkat, on the right bank of the Tigris and is now in the British Museum. The king says: “I brought down ten immense bull elephants in the region of Harran, and on the banks of the Haber. I took four elephants alive. The skins and tusks, as well as the live elephants, I sent to my city Asshur.”†

*“Altorientalische Texte,” ed. by Dr. Hugo Grossman, Tübingen, 1909, p. 242. See also W. Max Müller, “Asien und Europa,” Leipsic, 1893, p. 263, and James Henry Breasted, “Ancient Records of Egypt,” Chicago, 1906, Vol. II, p. 232.

†Keilinschriftliche Bibliothek, ed. by Eberhard Schrader, Vol. I, Berlin, 1889, p. 30. German trans. by Hugo Winckler.

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Aristotle, who very probably secured his information through the good offices of his royal pupil Alexander the Great, gives certain details regarding elephant hunting, which appears to have been carried on in the India of three centuries before Christ much in the same way as in our own day. He says that the elephant hunters were mounted on tamed elephants of proved courage. When they came up with their untamed brothers they belaboured these lustily



HEADS OF SOCRATES AND ZANTHIPPE, AND OF ANYTUS AND MELITUS, combined with head and trunk of elephant. The connection with Socrates is obscure, but it has been conjectured that some analogy was seen between the ungainly form and the supposed virtues of the elephant, and the ugly face but supreme excellence of the philosopher

—From Kuypert's "De elephantis in nummis obviis," Hagæ Comitum, 1719.

with trunks and tusks until they were completely subdued. When this task had been accomplished, some of the hunters got on the backs of the vanquished animals and were able to control their movements by the use of goads. Aristotle's informants assured him that as long as the mahouts sat upon the elephants they were docile and obedient, but some of them became wild again when they were riderless. As a punishment these had their forefeet bound together so that they could scarcely move.*

While Alexander himself, who is said to have been very skeptical as to the warlike qualities of the elephant, made

*Aristotelis, "Historia animalium," Lib. IV, cap. 9.

at most a sparing use of those he captured or otherwise secured from the Indian rulers, his successors pursued a different policy, possibly because their armies were in most cases largely made up of Asiatics who had a traditional respect for the onset of these ponderous beasts. In Egypt, where a supply of African elephants was to be had in regions not too far removed to be accessible, as early as the time of Ptolemy Philadelphus regular hunting expeditions were organized for their capture; indeed, Agatharcides states that this Ptolemy was the first to institute such hunts. It is, however, quite certain that, as we have seen, something of the kind had already been undertaken many centuries earlier by the native Egyptian sovereigns, perhaps only to obtain the ivory of the tusks. The same writer assures us that Ptolemy Philadelphus forbade the use of elephant flesh as a food, as he desired that the lives of all captured should be spared; the Egyptian "elephant-eaters" (*elephantophagoi*) vigorously resisted this decree, as doing violence to a long-standing habit. So earnestly did this Ptolemy carry out his plans for obtaining African elephants that he is said to have founded a town on the banks of the Red Sea as a headquarters for his elephant hunters, where they could fit out their expeditions, and whither they could bring in and care for the elephants captured by them. After Egypt became a Roman province, toward the end of the first century B. C., these hunts were neglected, as the Romans did not favour the employment of war elephants.*

The Lybians had the custom of interring with great pomp the bodies of those who met their death while hunting or combating elephants, and certain special chants were composed for and sung on these occasions, for they held that those who ventured to attack such powerful animals

*Gisberti Cuperi, "De elephantis in nummis obviis," Hagæ Comitum, 1719, col. 51-55.

gave proof of great courage, and they also held that the recital of their glorious act constituted their best epitaph.*

A Roman polychrome mosaic of the second century, found some time since in the course of excavations made on the site of the ancient Etruscan city of Veii, depicts the methods employed at that time in embarking elephants. The representation shows a boat, moored near the shore, with which it is connected by a plank bridge. Along this the elephant is being guided. On board the vessel are a master and four men, while four other men on shore assist in the somewhat difficult task of embarkation. The details of the operation are very carefully delineated. The forelegs of the elephant are hobbled so as to prevent it from escaping; to the right foreleg is attached a cord, on which the men on board are pulling, one end having been passed around the mast and secured to two staples in the deck; to the left foreleg is fastened another cord, one end of which is held by the shipmaster and the other end by one of the men on shore; this is used to steady the elephant. A third cord, fastened to the left hindleg, is not anchored, but is firmly held by three of the men on shore, who have braced themselves to check any too sudden forward movement of the elephant which, hampered as it is, has been left just sufficient freedom of motion to permit a slow advance movement across the temporary bridge. This very interesting relic, the earliest representation of the kind that we have, belonged originally to Empress Theresa of Brazil, wife of Dom Pedro, and was inherited by her daughter, the Comtesse d'Eu; it is now in Paris.†

Of elephant hunting in ancient times we have the state-

*Claudii Æliani, "Varia historia," xii, 55.

†R. Cagnat, "La première représentation connue du mode d'embarquement de l'éléphant," in *L'Ami des Monuments et des Arts*, Vol. XIV, Paris, 1900, pp. 67-70.

ment of Pliny that the African natives caught them in great ditches dug out for this purpose. He adds as a proof of the animals' devotion to one another that when one of them fell into such a ditch, all the others of the herd came to his rescue, heaping up boughs and rolling down blocks and stones and any other material at hand to fill up the ditch, and making the most strenuous efforts to rescue the captured animal.*

In the old cosmographies the various lands and the main divisions of the earth were often specially marked by the figure of the animal most characteristic of the region, and for Africa, more especially for Central Africa, this was invariably the elephant. The satirist Swift wings one of his shafts in this connection in the following lines:

“So geographers, in Afric maps,
With savage pictures fill their gaps,
And o'er inhabitable downs
Place elephants for want of towns.”

Although ivory was so often employed for ecclesiastical ornaments and for the adornment of the covers of devotional books, the churchman, Thomas de Cantimpré (born at Leuwis near Brussels in 1201), or his interpreter, Konrad von Megenberg (b. 1309), seems to show a surprising unfamiliarity with the true source of this beautiful material. Von Megenberg, in his old German translation of De Cantimpré's unpublished “*De Rerum Natura*,” writing of the “helfant,” as he calls it, states that when it was hunted it would fall down upon the ground or upon the stones and would thus break its bone; and it was for this the animal was hunted because “helfenpain” (elfenbein) or “elephant bone” was a most prized object. Possibly

*Plinii, “*Naturalis Historia*,” Lib. VIII, Cap. viii,

the idea may have been that by falling on its tusks the elephant broke them off, but this is not clearly or definitely expressed.*

When Master William Towerson, merchant of London, sailed along the Guinea Coast, in 1556 and 1557, he, on several occasions, secured elephant tusks from the natives, and he tells us that for one weighing thirty pounds he gave in exchange six "of our basons." On January 4, 1557, he made an essay of elephant hunting on his own account, taking with him thirty men equipped with arquebuses, pikes, longbows, crossbows, partisans, and swords and bucklers. They sighted two elephants and succeeded in wounding them several times, but the hunt was a failure, for the animals escaped after injuring one of the hunters.†

The Portuguese traveller, Duarte Lopez, who went to the Congo in 1576 and resided in Loanda until 1587, describes the pits dug by the natives to capture elephants in much the same terms as are used by the travellers of our day. They were broad at the top and gradually narrowed as the depth increased, so that the animal falling into one of them became so tightly wedged in that escape, and even movement, was impossible. They were hidden by a covering of grasses and leaves of a kind that the elephants habitually chose for food. In this connection, Lopez relates that on one occasion a female elephant accompanied by her young came near one of these pits, and the baby elephant fell in. The mother trumpeted wildly and made frantic efforts to drag him out; but when she saw that this was impossible, she determined to assure him a quick death and preserve him from the tender mercies of human kind. So she filled up the pit with earth,

*Konrad von Megenberg, "Buch der Natur," ed. by Dr. Franz Pfeiffer, Stuttgart, 1861, p. 134.

†See "Hakluyt's Voyages," Vol. V, Glasgow, 1904, pp. 155, 215.

stones, and branches of trees, completely burying her offspring beneath them.*

Elephants figure in a legend of St. Thomas, represented to have carried the Gospel into India. To his activity was believed to be due the name St. Thomas, given to a province on the Coromandel Coast. At the time the apostle was in this region an immense tree had fallen across the river at Meliapur, interrupting river traffic. To remove the obstruction, the king ordered that ropes should be wound around it and then attached to three hundred elephants. This was done, and the animals were urged to exert all their strength, but they were unable to pull off the enormous tree trunk. The sovereign then promised a large reward to any one who could suggest a means of removing it. St. Thomas, hearing of this, came before the king and offered to do the work unaided if the king would allow the trunk to be cut up and a chapel built of the wood. The king and the Brahmans, thinking this was merely a vain boast, gave their consent; but St. Thomas, after attaching to the trunk the zone, or girdle, he wore about his loins, was able without effort to draw it out of the river. Many of the Hindoos present were so much impressed by this miracle that they became converts to Christianity. The Brahmans, however, seeing the danger to their religion, hired assassins who put the apostle to death. The legend goes on to state that the descendants of these assassins were born with legs resembling those of the elephant.†

A war between Pegu and Siam, in 1568, was caused by the refusal of the Siamese to sell a sacred white elephant which the Peguans wished to acquire. They were willing

**Vera descriptio regni africana quod tam ab incolis quam ab Lusitanis Congus appellatur per Philippum Pigafattam*; Latin trans. by Reinius, Francofurti, 1598, p. 20; Lib. I, cap. X (Pigafatta's work, pub. in Rome in 1531, was from notes of Lopez).

†Johannis Hugonis Linschotii, "India Orientalis"; Lat. trans. by Teucrider Annæus Lonicerus, Francofurti, 1599, p. 41, cap. XVII.



SCENE FROM A FAIRY FOLKLORE TALE OF THE WHITE ELEPHANT

CEYLON

FROM A WATERCOLOUR.

COURTESY OF DR. CHARLES A. BRADDOCK, JR.



A FRESHLY DUG ELEPHANT PIT

THE TOP WILL BE COVERED WITH CROSS STICKS AND HIDDEN BY EARTH LOOSELY THROWN OVER THE STICKS. THE HEAVY BODY OF AN UNWARY ELEPHANT CRASHES THROUGH THIS FRAIL COVERING, THE ANIMAL'S GREAT FEET BECOME WEDGED IN AT THE BOTTOM OF THE PIT, AND IT DIES A LINGERING DEATH.

to pay the price that might be set upon it, but could not persuade the Siamese to part with it. The result was war and a disastrous defeat for the Siamese, resulting in the subjugation of their country.*

Of the various devices used in the Belgian Congo for maiming and killing elephants, that employed by the Bengalas, and also by the Waregas, is rather distinctive. A heavy mass of wood in which is embedded a sharp, triangular iron point, is suspended vertically at a considerable height from two trees on either side of an elephant trail, and one end of the line which maintains it in place is attached to a block of wood placed in the middle of the trail, so that a passing elephant treading upon this block will release the suspended lance. Because of the great weight of the wooden mass and the height from which the lance falls, the wound inflicted upon the beast is a terrible and deadly one. While the natives as a general rule depend upon such devices, or upon their native weapons in the hunt for elephants, a very few have been instructed by the Arabs in the use of firearms for this purpose.†

Elephant hunters in Sangoland, Africa, are not willing to trust to their natural ability and experience alone, but are great believers in the efficacy of spells and conjurations. Before setting out on a hunting expedition the hunters assemble at a spot where two roads cross each other; here an offering of meal is made to the appropriate divinity. The leader of the party then seizes a knife and makes superficial cuts on various parts of the arms of each hunter; the blood

*Johannis Hugonis Linschotii, "India Orientalis;" Lat. trans. by Teucrider Annæus Lonicerus, Francoforti," 1599, p. 46; cap. XIX. Plates by the brothers De Bry. Pl. XVIII shows the King of Cochin-China riding on an elephant. Both the king and his courtiers are almost nude. The sovereign was distinguished from his nobles by a richly jewelled bracelet, or amulet, and by large earrings set with precious stones.

†Collection de monographies ethnologiques, I, Les Bengala, by C. van Overbergh and E. de Jonghe, Bruxelles, 1907, p. 164.

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that flows from these cuts is received in a vessel and is poured into the muzzles of the guns. At the same time a special form of conjuration, supposed to render the hunter invisible to his quarry, is pronounced. Thereupon the wounds in the arms are dressed with a decoction made from an elephant's trunk and upper lip. In addition to all this they have a form of amulet which, when bound on a hunter's wrist, insures the accuracy of his aim, and if attached to his waist confers invulnerability. This is a little, perforated, wooden rod.*

The genesis of what has probably already become a bit of local African folklore in regard to an elephant is related by the famous English elephant hunter, James Sutherland. In the course of one of his expeditions into equatorial Africa he came across a fine herd of elephants, but as they got wind of his approach he was only able to bring down one of them, a large bull elephant, with a well-aimed head shot. The animal fell prone upon the ground, apparently mortally wounded. To make sure of his quarry, Sutherland came close up to the elephant and placing the muzzle of his rifle within a foot of its head fired a shot at the correct angle to carry the bullet to the brain. A convulsive tremor passed over the animal's body, the tail stiffened, and the hunter was confident that death had already ensued, or would shortly follow. Therefore, with his native attendants, he took up the trail of the other elephants, but found that he could not hope to overtake them. After an interval of about two hours he sent one of his men back to locate the place of the elephant he had shot; however, in a short time the native returned and announced, with an astonished and mystified air, that the animal was nowhere to be seen. Sutherland then accompanied him to the spot and soon

*Report of missionary Heese, in *Archiv für Anthropologie*, New Series, Vol. XII, Pt. 2, pp. 134-146; Braunschweig, 1913.

found unmistakable traces on the tree trunks and the ground showing that the animal had staggered to its feet and laboriously made its way through the forest. As they followed the trail, they could note that, little by little, the elephant's tread had grown firmer and its pace had evidently accelerated. Vainly they followed the trail for several hours, and were at last forced to give up the pursuit and allow the "dead" elephant to escape. The natives, however, immediately explained the strange happening in the light of their superstitions, declaring that it was no real elephant the hunter had shot, but a *majavie*, or wizard, who had taken up his abode in an elephant form.* Doubtless this tale spread about among the tribesmen and has by this time developed into a wild and wondrous legend.

Among the Kukus of the Anglo-Egyptian possessions, the native elephant hunters climb trees near the elephant trail, and when the animals pass, cast their lances at them, aiming to hit the shoulder. The shaft and head of the lance used for this purpose are exceptionally long, the head measuring 36 cm. (about 14 in.) and the bamboo shaft 1.65 m. (5 ft. 5 in.), the end of the shaft being enrolled with elephant hide firmly bound by thongs.†

An example of unscrupulous business methods in interior Africa is afforded by the conduct of the Asande chiefs toward the Ababuas. They cleverly circulated among the whites the report that the latter were a race of savages and that no white man could enter their country except at the peril of his life. Not content with this they succeeded in persuading the Ababuas that the white men were very bloodthirsty and cruel, and that should any Ababuas ap-

*James Sutherland, "The Adventures of an Elephant Hunter," London, 1912, pp. 112, sqq.

†Collection de monographies ethnologiques, VI, Les Kuku, by Joseph Van der Plas, Bruxelles, p. 164.

proach a settlement of white men they would be either hanged forthwith or else sold into slavery. By these means the sly Asandes were able to buy up all the ivory collected by the Ababuwas at a very low figure, and then sell it to the traders at a great advance in price.*

It is a common practice among the poachers in the Belgian Congo to take the spoil to Uganda where they are compelled to pay an import tax of 24 per cent. and also an export tax of 25 per cent. A single poacher has been known to have 3 tons of ivory in his possession. In one instance a poacher was overtaken by the Belgian Congo officials and the ivory taken from him, as well as his money and his guns. By some peculiar means it was only a matter of a few weeks before he returned to Mombasa with 3 more tons of ivory, which must have been stolen from the natives.

The romantic career of a great elephant poacher has just had a tragic termination in the death of the American, James Ward Rogers, who for years carried on an extensive and exceedingly profitable illicit trade in ivory in the out-of-the way regions on the limits of the Congo State and along the Lado Enclave. He had succeeded in organizing here a species of rude but very effective government, of which he was the uncrowned king. Many ineffectual attempts were made by the Soudanese officials to put an end to his career. Finally, a small expeditionary force was sent out under Captain Fox, who had instructions to take the poacher dead or alive. The almost impassable jungle rendered the task of the pursuers extremely difficult and arduous; frequently they came in sight of Rogers and his party, but were unable to overtake them. At last, after following him into the Belgian Congo, the expedition came, almost unexpectedly, upon the camp of the outlaw. One of Rogers's native guards informed Captain Fox that the poacher had taken refuge

*Burrows, "The Land of the Pygmies," London, 1898, p. 201.



A SMALL HERD OF ELEPHANTS RESTING IN A BIT OF BRUSHWOOD

THE BULL AT THE RIGHT HAND SIDE OF THE VIEW HAS JUST CAUGHT SIGHT OF AN APPROACHING HUNTER AND IS ABOUT TO CHARGE. COURTESY OF MR. CARL E. AKELEY. FROM JOURNAL OF THE AMERICAN MUSEUM OF NATURAL HISTORY, VOL. XII



HEAD OF BULL ELEPHANT KILLED BY MR. CARL E. AKELEY
THE EARS ARE OF EXCEPTIONAL SIZE, MEASURING 6 FEET 5 INCHES IN DEPTH
(COURTESY OF MR. CARL E. AKELEY)

in a hut, which he pointed out. The captain immediately entered it and saw one white man stretched out on a couch and another seated at his side. "Which is Mr. Rogers?" he asked. "Mr. Rogers has been shot," answered the man seated by the couch. The one who was lying on it drew a revolver, and pointing it at Captain Fox, said: "Yes, and by your men. I did not think they could kill old Rogers, but they have got him this time. Still you are on Belgian territory and you stand more chance for arrest than I do." The captain's position was a rather ticklish one, but he stood his ground bravely, and ere many minutes had passed Rogers was in his death agony, and he expired, defiant to the last.

The wholesale destruction of human life and of property entailed by the ruthless search for ivory by Arab traders in the Congo region, before the establishment of more orderly conditions in that territory, is eloquently stated in the following words by the great African traveller, Henry M. Stanley, in his account of his expedition to this part of Africa in 1887-88.*

"Every tusk, piece, and scrap of ivory in the possession of an Arab trader has been steeped in human blood. Every pound weight has cost the life of a man, woman, or child; for every five pounds a hut has been burned; for every two tusks a whole village has been destroyed; every twenty tusks have been obtained at the price of a district with all its people, villages, and plantations. It is simply incredible that, because ivory is required for ornaments or billiard games, the rich heart of Africa should be laid waste at this late year of the nineteenth century, and that native populations, tribes, and nations should be utterly destroyed. Whom does all this bloody seizure enrich? Only a few dozens of half-castes, Arab and Negro, who, if due justice

*Stanley, "In Darkest Africa," London, 1897, p. 153.

were dealt to them, would be made to sweat out the remainder of their piratical lives in the severest penal servitude."

In the distribution of the loot, the large pieces of ivory, weighing more than 35 pounds each, became the property of the proprietor of the caravan; those weighing from 20 to 35 pounds belonged to the headmen, and the smaller pieces were left in the hands of those who had been lucky enough to secure them. Thus all the members of the caravan were directly interested in obtaining as much of the precious material as they could lay hands upon, at any cost.

At this time Emin Pasha, for whose relief Stanley's expedition had been organized, is said to have accumulated 75 tons of ivory, which Stanley estimates to be worth £60,000, putting the pound of ivory at 8 shillings. He made a bargain with the Arab chief, Tippu Tib, who agreed to furnish native bearers for this ivory at the rate of £6 per "loaded head" for the trip from Stanley Falls to Lake Albert and return, and he calculated that if each bearer carried a weight of 70 pounds, the total profit would amount to £13,200, which could be turned over to the fund at Stanley Falls. He later states that 1,355 loads (some 100,000 pounds) were so conveyed, but some large tusks weighing 150 pounds each had to be left behind, as they were too heavy to be transported in this way.*

One of our Nimrods, the Rev. Dr. W. S. Rainsford, in relating certain of his numerous explorations in the haunts of wild animals, remarks that for crossing treeless stretches in British East Africa elephants cautiously select the night-time, rarely venturing out into the open in daylight in regions frequently disturbed by hunters.†

By British supervision of elephant hunting in their African

*Op. cit., pp. 31, 32.

†Dr. W. S. Rainsford, "The Land of the Lion," *World's Work*, June, 1909, p. 11707.

territory one excellent result has been accomplished through stringent regulations prescribing heavy fines, namely, the protection of cow elephants from slaughter. Ivory from this source is contraband. The laws also forbid the shooting of elephants bearing tusks the pair of which weighs less than 60 pounds. That some innocent mistakes are almost if not quite unavoidable may be admitted, but as a general rule the experienced hunter has no excuse; in the case of cow elephants the marked difference in size as compared with bull elephants, and the smallness of the tusks, combine to serve as warning indications.*

A circumstance often noted by elephant hunters and that aids them materially in their chase is the poor sight of elephants; they scarcely appear able to recognize the form of a man at fifty yards' distance, and if the hunter keeps still he frequently remains unnoticed when even but twenty yards away, if he be in the shade. But as a necessary compensation the sense of smell in these animals is very keen, and once they catch the hunter's wind their movements in attack or flight are exceedingly rapid. Doctor Rainsford notes one instance of a hunter's extremely narrow escape from being crushed to death by a charging herd which had suddenly scented his approach. The thick brush rendering even an attempt at flight impossible, the only thing the man could do was to cast himself down prone on the ground and let the herd pass over him. The danger of being trodden upon was imminent, and the foot of one of the elephants struck the ground so near to the prostrate form that part of the hunter's coat was torn away, but he suffered no bodily injury.†

The most effective shot the hunter can fire is one aimed between the eye and the ear of the elephant. The African elephant does not offer as good a mark for a shot at the

*Ibid., p. 11777.

†Ibid., p. 11777,

brain as does his Indian brother, the brain of the former being very small and protected by a bony framework of superior thickness; but a ball entering between the eyes, at the root of the trunk, will pass through the cellular structure of the skull directly to the animal's brain. This frontal shot, however, is more difficult to make than that between ear and eye, because of the smallness of the mark and the necessity of having the animal directly in front of you.*

It is stated that Sir Samuel Baker was the first hunter who tested the virtues of a small-bore rifle (.450, black powder) on elephants. He was led to do so because his favourite gun chanced not to be at hand at the moment, but he was so well satisfied with the result that he continued to make use of this calibre instead of a greater one. Later, the still smaller .303 English gun came into vogue, and was found to be effective against both elephants and rhinoceroses. Nowadays, with a powerful charge, excellent work can be done with a .256 Mannlicher or a .276 Mauser, and Doctor Rainsford writes that on one occasion a bullet fired from a Mannlicher at 200 yards' distance, and entering an elephant's body from behind, passed right through it and lodged in the heart.†

The supremacy of the Congo as an elephant field is unquestioned to-day. Of many remarkable successes made here by individual hunters, one is noted in which a four months' hunt brought in two tons of ivory.

The sport here is also said to entail less danger than in the British territory, the Congo elephants being less ferocious than those of Uganda or the British Protectorate. Though as a sport elephant hunting seems to exercise a great fascination, it is interesting to note that even the enthusiastic sportsman is sometimes moved to regard the matter with a

†Ibid., p. 11779.

*Ibid., p. 11781.



GROVE OF PLANTAIN TREES

IN A GARDEN DESTROYED BY ELEPHANTS

COURTESY OF MR. CARL E. AKELEY



TWO ELEPHANTS

KILLED IN EQUATORIAL AFRICA BY SHOTS FIRED SIMULTANEOUSLY BY MR. AND MRS. CARL E. AKELEY.

COURTESY OF MR. CARL E. AKELEY



**VIEW INTO THE DEPTHS OF A BAMBOO JUNGLE ON
MOUNT KENIA**

**SHOWING THE GROWTH OF YOUNG SHOOTS THAT ARE FAVOURED FOOD OF THE COWS AND
CALVES. COURTESY OF MR. CARL E. AKELEY.**

FROM JOURNAL OF THE AMERICAN MUSEUM OF NATURAL HISTORY, VOL. XII

little sentiment, as is shown in the following words of Doctor Rainsford:*

“I should not greatly care to kill any more elephants. They are too big, too old, and too wise to be classed as mere game. As I stood by the side of that vast fallen bulk I realized I had extinguished a life perhaps three times as old as my own. What had not that great beast seen and survived? What comings and goings of the tribes? What changes among the petty bands of men? It was probably a full-grown elephant when Livingstone first resolutely set his face toward Africa’s unknown interior. I felt small and a little guilty.”

In the National Museum at Washington are the three large elephants shot by Colonel Roosevelt in Equatorial Africa in 1909. The tallest of these was a rogue bull, shot in Uganda, and measuring 10 ft. 9 in. in height at the withers. A more bulky though somewhat shorter example of a bull elephant had a height of 10 ft. 6 in., with tusks weighing 65 pounds each; this was the first elephant to fall before the redoubtable Colonel’s rifle, and was shot on the slopes of Mount Kenia. The third of these Roosevelt bull elephants, shot somewhat later near Meru, had attained a height of 10 ft. 4 in. To these may be added a cow elephant which fell before the rifle of Paul J. Rainey, near Mount Marsabit, on the same expedition. The right tusk of this animal measured 5 ft. 7 in. in length and the left tusk 5 ft. 10 in., each having a diameter of 10 in.; the heavier one weighs 28 pounds.†

Although in many parts of Africa the wholesale slaughter of elephants has greatly reduced their numbers, they are still fairly plentiful in the Anglo-Egyptian Sudan, especially

*Ibid., p. 11782.

†Communicated by Dr. R. Rathbun, Director U. S. National Museum, Washington, D. C.

in the part south of 10° N. lat., a careful estimate placing the number at 30,000. The rainy season commonly induces a considerable migration to the northward into Kordofan, the Dar Homar country here being favoured, as the rest of the territory is too sandy to be a suitable habitat for elephants. Small herds can be found farther north than 10° N. lat., as on the White Nile up to 12° N. lat., whence the range slants northeastward across the Blue Nile. In this latter region there has been a notable increase of elephants during the past ten years. In smaller numbers they are present along the Dinder, Rahad, and Setit, and some may even be found as far to the north as the Gash, $14^{\circ} 30'$ N. lat.*

To regulate elephant hunting in the Belgian Congo, a decree of November 17, 1910, interdicted the killing of animals bearing tusks which weigh less than 10 kilograms (22 pounds) each, and of female elephants in general, more especially of those accompanied by their young. Permission may be secured from the proper authorities to kill two elephants having tusks of at least 10 kilograms' weight, and by special arrangement the right to kill a greater number may be obtained.

In the Anglo-Egyptian Sudan, while the natives are still permitted to kill elephants without any particular restriction, provided they confine themselves to the old native methods of hunting, the use of firearms for this purpose is strictly regulated, the holder of what is known as an "A" Game License only having the right to shoot two elephants in the course of a year. The fact that the possession of "cow ivory" or of bull tusks weighing less than 10 pounds is illegal, and that ivory of this description is subject to confiscation, operates as a practical restriction on native hunting as well as on that of Europeans. The native

*Communicated by Capt. Gilbert Clayton, Sudan Agent, War Office, Cairo, Egypt.

methods are similar to those practised in other parts of Africa, and include pitfalls, the dropping of heavily weighted spears from trees upon the animals passing beneath, etc. Another system involves the manœuvring of a herd of elephants into the dry grass; a girdling ring of fire is then started and the entrapped and bewildered elephants fall victims to the natives' spears. However, the employment of any especially destructive methods may be forbidden by the governor of a province.*

The Governor-General of the Belgian Congo issued on April 27, 1912, an ordinance reducing considerably the sum of money to be paid by native elephant hunters to the State, if they wish to keep the ivory they have secured. Heretofore, the charge exacted by the Government on all such ivory was 18 francs (\$3.47) per kilo, but the new ordinance substitutes the following graded charges according to the size of the tusks: for points exceeding 10 kilos in weight 15 francs (\$2.90) per kilo; for points weighing from 6 to 10 kilos, 10 francs (\$1.93) per kilo; on points running from 2 to 6 kilos, 7 francs (\$1.35) per kilo. It will, however, be noted that in view of the price likely to be obtainable by the natives from traders for their ivory these charges are still very heavy, and are calculated to discourage to a great extent any speculative venture on the part of the Congo hunters.†

The following provisions relating to elephant hunting are embodied in an ordinance of the Governor-General of the Belgian Congo, dated December 6, 1912, still further reducing the price on ivory secured by native hunters.

Elephants may be hunted by natives when provided with an authorization, which is gratuitously accorded to

*Vice-Consul Ross J. Hazeltine of Boma, in *Daily Consular and Trade Reports*, August 10, 1912, p. 750.

†Communicated by Capt. Gilbert Clayton, Sudan Agent, War Office, Cairo, Egypt.

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them. On any ivory they may secure, a tax of from 2.50 francs to 5.50 francs per kilogram, according to the weight of the tusks, is to be collected at the time the ivory is registered. No elephants having tusks of less than 2 kilograms' weight may be hunted.

Non-hunters may obtain for 1,000 francs the authorization to kill two adult male elephants. The ivory secured in this way must be registered, but no tax is levied on it, the cost of the permit being regarded as sufficient.

Any elephant may be killed when this is necessary for the defence of person or property. All ivory so obtained must be given over to the State, which will pay for it an indemnity equivalent to a quarter of its value. The same rule applies to the ivory of elephants found dead.

No special tax is to be levied on the commerce in ivory. The merchant who buys ivory still unregistered must, on registering it, prove that it has come from a proper source; otherwise, the ivory is to be confiscated.

An export duty is to be levied on ivory at the time of its exportation.

The natives of the Belgian Congo are permitted by the State to retain as their own property half of the ivory they may secure by elephant hunting, the price for the other half being put at such a reasonable figure as to assure a good profit should the native choose, or be able, to buy it. The fact that ivory is a peculiarly valuable commodity is fully realized by the natives of the Congo, for it has served to a certain extent as a medium of exchange ever since Arab traders first penetrated into this region.*

That elephants are growing scarce in the Belgian Congo is denied by traders who are familiar with the territory, the statement being made that along the course of the Kasai

*Vice-Consul General Ross J. Hazeltine of Boma, *Daily Consular and Trade Reports*, February 5, 1913, p. 627.

River large herds remain practically untouched. The fact that 514,085 pounds of ivory was exported in 1912, valued at \$1,172,581, as against 497,656 pounds in 1911, with a value of \$1,096,597, shows how large must be the number of elephants in this valuable Belgian colony.*

The elephants of Togoland (German West Africa) are threatened with extermination, there being no protective laws to control indiscriminate slaughter; indeed, so reckless and improvident are the native hunters that they do not even spare the young elephants, and now and then tiny tusks from a baby elephant are brought to the merchants. Hence the ivory exports are dwindling down, and were it not for the fact that the good price the material commands in Lome attracts some ivory from the Gold Coast, the amount exported would be still smaller. The figures for 1912 show exports of but 2,400 kilos, and in 1911 the returns were 2,150 kilos.†

In each of the West African colonies, including Nigeria, elephants are protected by special laws which prohibit the killing of young animals and of female elephants. A \$50 license only serves to permit the killing of one or at most of two elephants during the year for which it is issued.‡

The strict regulations in regard to the hunting of "big game" in the Transvaal** would, of course, serve to protect elephants from unlawful hunting, should any still be left in that region, but this does not seem to be the case. That they formerly ranged through the country is of course a well-known fact that finds confirmation in the names given

*Vice-Consul General Harry A. McBride of Boma, "Development of Belgian Kongo," *Daily Consular and Trade Reports*, April 16, 1914, p. 280.

†Diplomatic and Consular Reports No. 5226, Annual Series: Germany, Report on the Trade and Agriculture of Togoland (German West Africa), London, 1913, p. 9.

‡Communicated by U. S. Consul N. J. Yerby, of Sierra Leone, Africa.

**See Handbook of the Game and Fish Preservation Laws of the Transvaal Province, 1912, Pretoria, 1912, 50 pp., map and two "Addenda" of 15 pp. and 8 pp. respectively.

to many farm settlements, such as Olifantfontein, Olifantsvlei, etc. There is said to be a herd of elephants in a semi-wild state somewhere in the eastern part of Cape Colony.

In Rhodesia, however, where the European settlements are of so much more recent date, a certain number of elephants remain, and are protected by legal enactments. This state of things, though pleasant enough for the elephants, has proved less agreeable for the farmers, whose crops were often badly damaged by the wandering herds. Indeed, so earnest were the complaints made to the authorities from this source, that special permission is said to have been granted to kill a number of the aggressors.*

In this colony permits for shooting animals of the class denominated "Royal Game," in which the elephant is comprised, may be secured from the administrator if he can be assured that the animals are really required for scientific purposes. A £5 stamp must be affixed to the permit. Applications must be addressed to the Director of Agriculture and must be accompanied by documentary proof of good faith.

Should crops be damaged by any kind of game, the occupier of the land is authorized to kill the offending animals, and in certain "open areas" in the Hartley district and the Sebungwe district permission was given to shoot or capture all classes of game except ostriches and other birds classified as game, for a period of one year from July 1, 1913, the same privilege being accorded for the Lomagundi district from November 1, 1913. The shooting or capturing of elephants on the Walden Farm in the Hartley district, or within five miles of this farm, was granted for a period of one year from April 9, 1914, no special license being required. It is expressly decreed that the holding of a license to shoot

*Communicated by Dr. E. T. Mellor, Geological Survey, Mines Department, Pretoria, May, 1914.



THE WOUNDED COMRADE
SCULPTOR CARL E. AKELEY



COVERED ELEPHANT PIT

VIEW OF AN ELEPHANT PIT COMPLETED BUT A FEW WEEKS, AND YET MORE EFFECTIVELY CONCEALED BY A NEW GROWTH OF VEGETATION. THESE PITS ARE NOT ONLY A MENACE TO WANDERING ELEPHANTS, BUT CONSTITUTE A VERY REAL DANGER FOR THE ELEPHANT HUNTER AS WELL. COURTESY OF MR. CARL E. AKELEY.

FROM JOURNAL OF THE AMERICAN MUSEUM OF NATURAL HISTORY, VOL. XII.

game does not give the holder the right to shoot on private land without the landowner's permission.*

Elephant hunting is so severely restricted in India that the protection afforded the remaining herds seems to be quite effective. They are limited to forest land in Coorg, Mysore, Travancore, Orissa, and the northeastern part of the lower reaches of the Himalayas. The trumpeting of the elephant when in deadly peril is a most impressive sound, and we are told that it had such a charm for an especially bloodthirsty ruler, Mihirakula, king of the White Huns in the sixth century A. D., that he caused elephants to be cast over a precipice in order to enjoy their piercing cry. He had first heard this call of agony by chance when an elephant fell over the precipice at the Gate of Kashmir.†

Although a relatively small amount of the ivory worked up in India is derived from Asiatic elephants, these animals continue to be highly prized for their use in processions, native State ceremonials, and for hunting, as well as for the transportation of timber from the place where it has been felled to a landing on the river down which it is to be floated to its destination. The regularity and symmetry of its massive proportions are the leading qualities sought for in elephants for State and ceremonial use, while mere physical force is prized in an elephant to be used for labour or transportation. In the extensive forest tracts of India all the way from the foothills of the Himalayas to the southern part of the Indian Peninsula elephants may still be found in a wild state, the strict protective legislation having operated to save them from slaughter. The territory of Mysore is said to afford shelter to a greater number

*From Summary of "Game Law Consolidation Ordinance, 1906," and Regulations issued thereunder.

†Andrews, "The Elephant in Art and Industry," in the *Journal of Indian Art and Industry*, Vol. X, p. 54, 1903-4.

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of these animals than any other of the Indian states. As a proof of the large number of elephants still existing in this particular region, it is related that when, in November, 1913, the Viceroy of India visited the State of Mysore, he was entertained with an elephant drive on a large scale, as a result of which one hundred and thirty elephants were captured. Of these twenty-four were transported to Bombay and were there duly invoiced at the American Consulate for exportation to the United States, where they were destined to be used by enterprising circus managers for the entertainment of the public. The prices realized ranged from \$166 for a baby elephant, only 3 ft. high, to \$583 for a female elephant, 5 ft. 3 in. in height; the average price was about \$500, the whole of this consignment bringing in \$11,757.*

The so-called "*Kheddah* plan" is the one in use in India when entire herds of wild elephants are to be captured. The term is derived from the *keddah* or enclosure, from six to ten miles in circumference, into which the wild elephants are driven, and about which is a fence of split bamboo, put up after the animals have been induced to enter the enclosure. Such an elephant hunt on a large scale often requires the aid of as many as 370 men, and a considerable number of tame elephants, one for every two of the wild elephants to be secured, to carry the requisite provision of fodder for the latter, and to lead them daily to a place for drinking and bathing. The captured elephants are allowed to remain in comparative freedom for some little time in this improvised enclosure, so that they may have time to accustom themselves gradually to the changed conditions. When they are supposed to have become at least partially reconciled to this modified loss of freedom they

*Consul Henry D. Baker of Bombay, India, "Report on Ivory and Elephants in India," June 8, 1914.



BREAKING WILD ELEPHANTS



**CAPTURED ELEPHANTS INSIDE THE CORRAL AFTER AN
ELEPHANT HUNT**

BANGKOK, SIAM

COURTESY OF DR. CHARLES S. BRADDOCK, JR.



ELEPHANT HERD CROSSING A RIVER
NEAR BANGKOK, SIAM



ELEPHANTS THAT CARRIED THE VACCINATION TRAIN
THROUGH THE JUNGLE

THE ELEPHANT AT THE RIGHT IS THE LARGEST ONE EVER CAPTURED IN SIAM
COURTESY OF DR. CHARLES S. BRADDOCK, JR., CHIEF INSPECTOR OF THE KING OF SIAM

are driven through a strong gateway, the gate being studded on the inside with iron spikes. Passing through this gateway and a passage flanked by stout palisades, they find themselves in a small enclosure, where, after the tame elephants have separated them one by one from the rest of the herd, each individual has its hind legs securely tied together, and a rope attached to its neck so that the animal can be led out to the forest, where it is picketed and kept until it is believed to be sufficiently tamed, so that it can safely be freed from restraint. It but rarely happens, however, that the largest and boldest male elephants in the herd can be captured by this method. These are generally secured by using female elephants as decoys, several of the latter being ridden out to graze in the vicinity of the bulls; the hunters riding on the decoys are so muffled up as to be effectually concealed from the eyes of the suspicious males. When the bulls have been enticed to close proximity, their legs are hobbled and the attaching ropes wound around the trunk of a tree.*

The Siamese elephants are effectively protected from the greed of ivory hunters by stringent restrictions, these animals being regarded as too valuable to be placed at the mercy of the hunter. All Siamese ivory, therefore, is provided by the tusks of elephants which have died of old age or disease, many falling victims to anthrax, and some to the deadly poison of the hamadryad, or "king cobra."†

The theft of an elephant would seem to be an exploit requiring unusual opportunities on the part of the thief for the removal and subsequent concealment of his unwieldy prize. However, in the Kingdom of Siam, where the Government owns large herds of trained elephants, there has

*Consul Henry D. Baker, of Bombay, India, "Report on Ivory and Elephants in India," June 8, 1914.

†Communication of Dr. Charles S. Braddock, Jr.

been in past years considerable loss from the depredations of elephant stealers. Of course the way in which the thief could profit by his theft was to smuggle the elephant over the frontier to some neighbouring country, and sell it there. For a time the Siamese Government found it exceedingly difficult to remedy the trouble, few of the stolen elephants being ever recovered. Recently, however, through a more energetic administration of the law by His Excellency, Chao Phya Surasih, efficiently aided by the provincial gendarmerie, the practice has been checked, only eleven elephants having been stolen in 1913–1914 in Siamese territory, nine of these being subsequently recovered.*

Both favourable and unfavourable results are reported as produced by the stringent governmental protection of wild elephants in Siam. While their immunity from attack has operated in the direction of a slow but progressive increase in their numbers, the cultivators of the soil find considerable difficulty in shielding their crops from the inroads of the elephants; during the rice harvest men must be set on watch in the fields and have to keep firing off their guns constantly to scare away the predatory animals. Many trained elephants are owned by the Government and by a few wealthy noblemen, as well as by the great companies dealing in teak, such as the Bombay, Burma, East Asiatic, and Borneo Company, and the price of these trained elephants is constantly advancing. The increased railroad facilities in certain districts of Siam operate to render the use of elephants less needed for transportation purposes, but in the hinterland they are still absolutely necessary.†

An amusing adventure with a rogue elephant formed one of the incidents of an arduous Christmas journey undertaken by two Englishmen who were camping in an out-of-

*The Bangkok Times, June 3, 1914.

†Communicated by Dr. Charles S. Braddock, Jr.

the-way part of Siam. To escape for even a few hours from the deadly monotony and loneliness, they determined to strike out over the open country so as to reach a small town about twenty miles away which offered some little chance of diversion. After a long and fatiguing tramp they came to a village where by the offer of an exorbitant price they were able to hire a bullock cart to bear them to their destination. One circumstance which made the villagers especially loath to let out a cart was the fact that a rogue elephant was known to be roaming about that part of the district. The Englishmen started on their way and were having a fairly comfortable time, dozing off in spite of the jolting on the plank bottom of the cart, when suddenly they were hurled out and precipitated into a ditch as though by an earthquake shock. Picking themselves up, more startled than hurt, they were horrified to see the rogue elephant making toward the spot where they were. To climb a tree and thus place themselves temporarily out of harm's way was the work of a few minutes, but before they had run down the road far enough to reach this refuge, on turning around they could see the wild elephant smashing their cart to splinters. This encounter happened in the night time and the poor fellows did not venture to come down from their perches until by daylight they could assure themselves that the raging elephant had gone off.*

The docility of the Siamese elephants is not always to be depended upon, for several cases of apparently unprovoked ferocity are reported of them. During his long residence as Court Physician in Siam, Dr. Charles S. Braddock, Jr., was on one occasion called in to attend a native who had been fatally injured by an on-rushing elephant supposed to have been domesticated. The animal, after throwing the

*From *Bangkok Pioneer*, December 24, 1913; item signed Tok To; kindly communicated by Dr. Charles R. Braddock, Jr.

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man down and trampling on his body, picked up the senseless form with its trunk and hurled it a distance of fifteen feet into the waters of a canal. That medical and surgical aid should prove of no avail after such an experience was inevitable.

It is estimated by one of the great ivory dealers that 50,000 elephants are killed every year for their ivory. At the present rate of extermination, in ten years the elephant will have become an extinct mammal and the ivory exceedingly rare. Of course, a considerable part of the ivory exported comes from animals that have died a natural death, but still there is no reason to doubt that the above estimate is rather too low than too high.

CHAPTER VI

SOURCES, COMPOSITION, AND QUALITIES OF IVORY

WHAT is ivory? We all know it as one of the most attractive art materials, but the structural qualities to which its beauty and appropriateness are due and the sources whence it is derived are often lost sight of by those who fully appreciate its rare beauty when they see some artistic object executed in this soft-toned and yet rich and lustrous material. In its most restricted sense, the term "ivory" denotes primarily elephant ivory, although as generally employed the designation covers many other forms of dentine.

The characteristic distinction between true ivory and other forms of dentine appears on examining a transverse section, when wavy lines of different shades are observable, their decussations enclosing minute approximately lozenge-shaped spaces in concentric rows. Under the microscope the tubular structure is revealed, the tubes being exceedingly minute and closely set; their smallest branches are immeasurably fine, while at the largest point they only average 1-1000 of an inch. Their angular gyrations are much more marked than are the secondary curvatures of ordinary dentine; these are believed, in both cases, to be due to successive stages of calcification. Through the tubes pass from the central pulp excessively fine threads of a protoplasmic substance. The disposition and the peculiar curvature of the ivory tubes serves to render the entire

tissue exceptionally tough and elastic.* When ivory decomposes it disintegrates along the lines of the concentric interglobular spaces, and fossil ivory in this state presents the appearance of a series of detached concentric rings.†

Occasionally the grinders of elephants have been worked as ivory, but their triple composition of enamel, dentine, and cement renders them difficult to cut, and they do not yield a material sufficiently homogeneous to constitute a satisfactory substitute for true ivory from the tusk.‡ Walrus teeth and the tusk of the narwhal have also been used, the former to a certain extent by dentists. The latter were the famous unicorn's horns of past centuries, and are now rather kept as curiosities than turned into material for the useful or ornamental arts.

The characteristic appearance presented by a cross-section of ivory, the series of curved lines produced by a bending of the tubules constituting the dentine, is first observable in the palæontological series leading up to the modern, in the case of the large upper tusks of *Tetrabolodon angustidens* from the Lower Miocene of Northern Africa, Europe, and probably Asia;** the exceptionally large lower tusks of some American *Tetrabolodons* show the same formation.

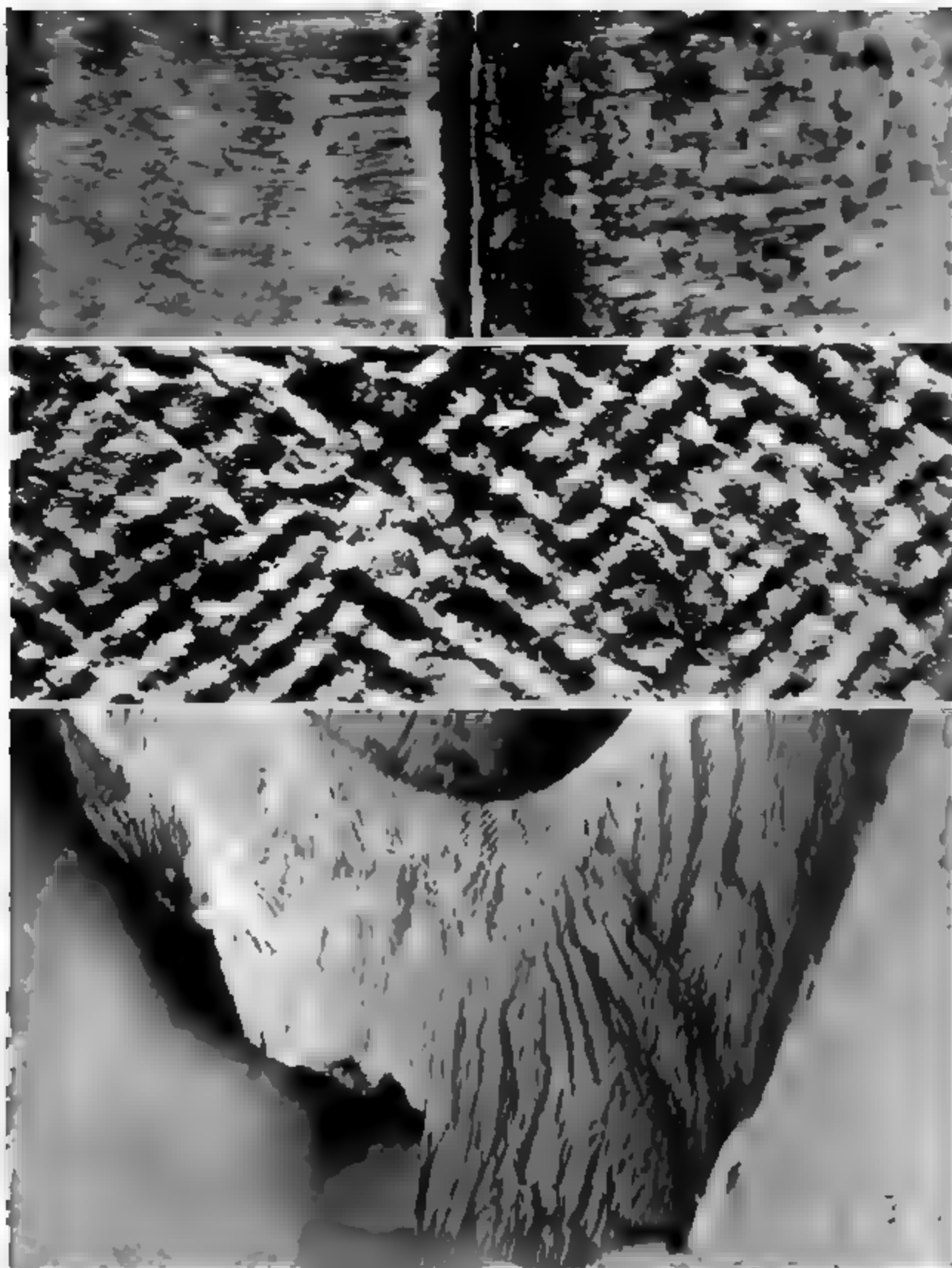
The dentition of the elephant is very characteristic and peculiar. The first tusks (developed incisors) are shed, and are replaced by a second growth, which remains, increasing gradually in length and weight until the animal's death. The molars, however, are renewed no less than five times in the course of the elephant's life. Only four

*W. B. Carpenter, "The Microscope and Its Revelations," 7th ed., London, 1891, p. 948; see also Professor Owen, in *Journal of the Society of Arts*, Vol. V, pp. 65-70; December 19, 1856.

†Charles S. Tomes, "A Manual of Dental Anatomy," 3rd ed., London, 1889, p. 373.

‡Holtzapffel, op. cit., Vol. I, p. 139.

**Andrews, "A Guide to the Elephants (recent and fossil) in the British Museum," London, 1908, pp. 23, 24.



THE STRUCTURE OF IVORY

I. TRANSVERSE SECTION OF ELEPHANT TUSK, ENLARGED 30 TIMES, SHOWING THE OUTERMOST STRUCTURE OR GROWTH RING IN WHICH THE BONE CANALS ARE DISTINCT, THESE LATTER APPEARING AS SMALL DARK KNOTS ON THE RADIATING LINES. AT THIS ENLARGEMENT THE STRUCTURE NODES WHICH PRODUCE THE CLOTH OR LATHE-TURNED PATTERN ARE TOO FAR APART TO COME INTO ALIGNMENT.

II. NATURALLY WEATHERED TRANSVERSE FRACTURE OF A FLORIDA MASTODON TUSK. ENLARGED ABOUT 12 TIMES TO SHOW HOW DISTINCTLY THE PATTERN DISCERNIBLE IN THE TRANSVERSE SECTION IS PRESENT IN THE FOSSIL FORMS, AND EVEN CONDITIONS EROSION OR WEARING OF THE TUSK FRAGMENTS. BUT THE CLOTH PATTERN IS ALSO QUITE PLAIN ON THE FRESHLY BROKEN SURFACES.

III. SECTION OF TUSK SHOWING FORM AND EXTENT OF INTERIOR HOLLOW PART.

COURTESY OF PROF. G. R. WIELAND

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of these, two in the upper and two in the lower jaw, are developed and in use at the same time, but at more or less regular intervals these are renewed, the new teeth not growing beneath the old ones, but being developed alongside of them in the jaw, and pushing them out sideways. There are thus six double pairs of molars grown in the course of a normal period of life, the first set appearing at the age of two weeks and lasting until the second year, when the teeth are replaced by the second set which is shed when the animal is six years old; a third set follows, lasting until the ninth year, and a fourth, which remains longer, until the elephant is from twenty to twenty-five years old; then comes the fifth set, only shed in the sixtieth year; and lastly the sixth set, which may serve for forty to sixty years longer, as the elephant sometimes reaches the age of one hundred or even one hundred and twenty years or more. In structure the teeth differ from those of any other mammal, being composed of vertical plates of dentine surrounded by enamel and connected by a cement. When worn down by use the surface of these large molars shows alternating layers of cement, dentine, and enamel.*

That portion of the animal framework that is exposed and projected, and is not protected by covering of any sort, is harder and finer textured than the material properly known as bone. Exposed as the former material is to blows and friction, its hardness and toughness take the place of the protection that covering affords to bone. This applies in a general way to tusks and teeth of all kinds.

Bone is the framework of the animal. It braces, holds, carries, and binds together the flesh, blood, and organs by which it is covered and surrounded; and the necessity for

*Richard S. Lull, "The Evolution of the Elephant," Annual Report (1908) of the Smithsonian Institute, Washington, 1909, pp. 645, 646. Reprinted from *Amer. Jour. Sc.*, Vol. XXV, March, 1908.

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the elasticity by which the body is kept flexible and movement rendered easy is the reason why bones are as a rule porous and less solid than ivory, although some of the bones of the body are very hard, notably those that are used as substitutes for ivory.

The material commonly understood under the term "ivory" comes from elephants, whales, and other animals, in whose structure tusks and teeth are notable features. Great toughness and tensile strength must therefore be its leading characteristic. In the case of the elephant, especially, the tusk is the animal's chief offensive and defensive weapon. Untold thousands of elephants have been bereft of their lives to secure these tusks, for they are, so to speak, the animal's jewels. A very curious circumstance is that not uncommonly there is found buried in a tusk an iron bullet, which was intended to kill the animal, but which got no farther than a lodgement in the very thing the hunter aimed to possess. In the course of time it was covered by the material with which the tusk is built up, and no outward traces remained to betray its presence, it having become completely encysted. Spearheads may also become encysted in the same way, as is shown by a specimen now in the Museum of the Odontological Society in London, where a spearhead, $7\frac{1}{2}$ in. long and $1\frac{1}{2}$ in. wide, had entered at a point near the skull and was so completely encysted that nothing in the external appearance of the tusk revealed its presence.*

Perhaps the strangest instance of the finding of a bullet embedded in ivory, and one proving how completely concealed it may become in the course of years, is illustrated by a specimen in the Museum of the Royal College of Surgeons. This is a billiard ball within which a bullet

*Tomes, "A Manual of Dental Anatomy," 3d ed., London, 1889, p. 376; see also Combe, *Phil. Trans.*, 1801, p. 165.

was found after the ball had been turned.* As a general rule the tusks of cows are preferred for the manufacture of billiard balls, as they are less curved than the larger tusks from the bull elephants.†

The appearance presented by a diseased elephant's tusk is shown in sections of that of the elephant "Tip," of the New York Zoölogical Gardens. In his day a famous specimen of these gigantic pachyderms, poor Tip developed, in 1902, the form of madness and "badness" peculiarly characteristic of the male elephant in captivity. Several times his sudden and unforeseen attacks upon his keepers very nearly resulted in a fatal accident. Finally it was decided that capital punishment must be inflicted, but the choice of means to effect this end presented some difficulty. As the quickest and most effective agent of execution, cyanide of potassium was given the preference, but the elephant was so suspicious, and appeared to be so well aware of what was intended, that the greater part of a day passed before he could be persuaded to consume a mash in which the drug had been mixed. The result, when once he had absorbed the poison, was satisfactory enough. There was a mighty convulsion of his enormous frame, in the course of which he broke one of the heavy chains binding his foot to the side of the cage; then he lurched over and expired.

That a decayed elephant tusk can cause the animal to suffer excruciating pain is commonly believed by the natives of Ceylon, who assert that in a paroxysm of pain an elephant has sometimes broken off the tusk to escape the anguish. While this is not generally admitted, the observed fact that the pulp of the tusk is connected with the dentine by very tenuous filaments passing through the dentinal tubes may

*John Bland-Sutton, in the *Lancet*, Vol. 179, p. 1535, 1910. In this article Fig. 1, p. 1534, shows an iron ball encysted in the pulp chamber, and Fig. 4, p. 1535, a spearhead similarly encysted; both in the Museum of the Royal College of Surgeons.

†Op. cit., p. 1536, 1910.

be taken to indicate that cavities in a tusk might really cause an elephant to suffer exquisite pain.*

One of the finest collections of the abnormal growths sometimes to be observed in elephant tusks, as well as of tusks with encysted bullets, was presented by Mr. Charles H. Wood to the Buffalo Society of Natural Sciences. There are 120 specimens, thirty-four of these showing inclusions of bullets or spear points. When the bullets are of lead, the metal is generally scattered more or less, and has affected the ivory differently than in the case of steel bullets. It is said to poison the dentine, frequently causing large exostotic growths, exhibiting strange and abnormal bulbous or spicular forms, and hollow spaces often of large size. These tumors are designated odontoma, a term applied by Virchow to ivory exostosis of the teeth of elephants, especially of the molars, these exostotic growths being composed of hypertrophied dentine and resulting from morbid conditions of the pulp of tusk or tooth. On the other hand, in several instances where steel bullets were found, the ivory was only partly decomposed or absorbed away from the bullet, leaving it loose in a hollow enclosure, and thus making a kind of ivory rattle. Single examples of exostosis are 6 in. in length and $3\frac{1}{2}$ in. in diameter, being stalactitic or stalagmitic in character, or columnar with rounded protuberances. In one case 50 of these bulbous excrescences appear on a piece of abnormal growth 4 in. high and $1\frac{1}{2}$ in. wide. In another example a hollow secondary tusk had formed within the natural hollow, the interior piece measuring $7\frac{1}{4}$ by $6\frac{1}{8}$ in. across and being exceedingly thin. In a very peculiar instance a flattened bullet was found encysted in the hollow rim end of the tusk, where it was only three eighths of an inch wide, but a growth an

*Sir J. Emerson Tennent, "Sketches of the Natural History of Ceylon," London, 1861, pp. 227, 228.

inch through had formed around the bullet. Among the numerous interior growths several cuplike hollow masses are to be noted, one of these being $4\frac{7}{8}$ in. across, 4 in. high and $3\frac{1}{2}$ in. wide. In still another example a tusk measuring 6 in. across contained certain rounded growths of a whitish or yellowish dentine in which could be observed very small globular masses of a pronounced yellow. These minute globules were of an almost saffron yellow, apparently striated, and represented a different or subsidiary growth to that of the main mass. These specimens afford good evidence that many elephants are struck by shots but are not killed. In other words, judging from the number of tusks showing encysted iron or lead bullets, it is self-evident that these were not the bullets that ended the animal's life; of course the wounding of the tusk would at most give an elephant a powerful shock, and unless the shot that hit the tusk were closely followed by another to the brain, the animal would escape practically uninjured, and when the tusk has been traversed by the ball the direction usually indicates that it could not have inflicted a mortal wound even if its momentum were not too much lessened by the resistance of the ivory it had passed through. Instances of recent shooting showed that the ball had shattered the tusk and this had regrown, thereby proving that the bullet in question had not been that which had killed the elephant.

Of the irregular masses of exostotic ivory, one was 5 in. long and weighed 3 pounds. One of these growths resembled a seahorn. In one instance the tusk showed a large opening, beginning at its outer edge, running well into it and making a hollow space; this was apparently due to disease. In several examples a growth was to be seen extending across from one side of the tusk to the other, forming a sort of Siamese-twin ligature.

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In another of these diseased tusks there was a hollow space from a quarter inch to over an inch in diameter, running through the entire mass. Only two thirds of the tusk was sound, but a good judge of these abnormal conditions would be able to make a fairly accurate estimate of the extent of the loss of good material. Great loss of material may also result from the frantic attempts of an elephant to alleviate the acute pain caused by ulceration of the tusk by violent rubbing of it, and some of these ulcerated tusks have suffered so much from this abrasion that a great part has been rubbed away.

The following analyses of bone, dentine, and ivory are given by Mons. Adolphe Carnot:*

- I Human thigh bone.
- II Thigh bone of an ox.
- III Bone of the modern manatee or sea cow.
- IV Thigh bone of a Siamese elephant.
- V Tooth of an elephant (dentine).
- VI Tusk of an elephant (ivory).

	I	II	III	IV	V	VI
Phosphate of lime . .	87.45	85.72	81.82	90.03	86.67	82.08
Phosphate of magnesia	1.57	1.53	2.62	1.96	3.82	15.72
Fluoride of lime . .	.35	.45	.63	.47	.43	.20
Chloride of lime . .	.23	.30	.36	.20	.39	trace
Carbonate of lime . .	10.18	11.96	14.25	7.27	8.60	2.04
Ferrous oxide . . .	.10	.13	.15	.15	.20	.08
	<u>99.88</u>	<u>100.09</u>	<u>99.83</u>	<u>100.08</u>	<u>100.11</u>	<u>100.12</u>

This shows us that there is a very considerably larger percentage of phosphate of magnesia and a notably smaller percentage of carbonate of lime present in ivory than in bones and dentine. We may note here that elephant ivory

* Comptes Rendus de l'Académie des Sciences, Vol. CXIV, p. 1189: "Recherches du fluor dans les os fossiles."

contains from 40 to 43 per cent. of organic matter, while human dentine has only about 25 per cent.*

The following analyses of dentine are published in Tomes's "Manual of Dental Anatomy." I is by Von Bibra of perfectly dried dentine, II is another by Von Bibra, and III is by Berzelius:†

	I	II
Organic matter	27.61	20.42
Fat. . . . .	.40	.58
Phosphate and fluoride of lime	66.72	67.54
Carbonate of lime	3.36	7.97
Phosphate of magnesia	1.18	2.49
Other salts . . . . .	.83	1.00
	<hr/> 100.10	<hr/> 100.00
Gelatine and water		28.00
Sodium salts		1.50
Phosphate of magnesia		1.00
Phosphate of lime		62.00
Fluoride of lime		2.00
Carbonate of lime		5.50

In fossil ivory a much larger proportion of fluoride of lime appears than in that taken from animals of our day. This is believed by Monsieur Carnot to be due to metamorphosis, the fluorine having replaced to a certain extent the lime phosphate.

The density of ivory varies in specimens from different places; the specific gravity as given in Landholt's Tabellen‡ is from 1.83 to 1.92; the Annuaire of the French Bureau des Longitudes** gives a slightly higher figure—namely, 1.93.

*Tomes, op. cit., p. 373.
†Tomes, Charles S., "A Manual of Dental Anatomy," 3d ed., London, 1889, p. 63.
‡Landholt's physikalisch-chemische Tabellen, Berlin, 1894, p. 67.
**Annuaire pour l'an 1906. Publiée par le Bureau des Longitudes, Paris, 1906, p. 439,

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The tensile strength is so great that thin longitudinal strips cut from a whole tusk have constituted excellent riding whips.

Ivory is electrically positive and in the electrostatic series of Faraday occupies a place between cat fur and bear fur on the one hand and feathers and quartz on the other.* Its relative radiating and reflecting power as compared with some other substances is given as follows:†

	RADIATING AND ABSORBING POWER	REFLECTING POWER
Lamp black	100	0
Water	100	0
Carbonate of lead	100	0
Ivory, jet, marble	93-98	7-2
Glass	90	10
Ice	85	15

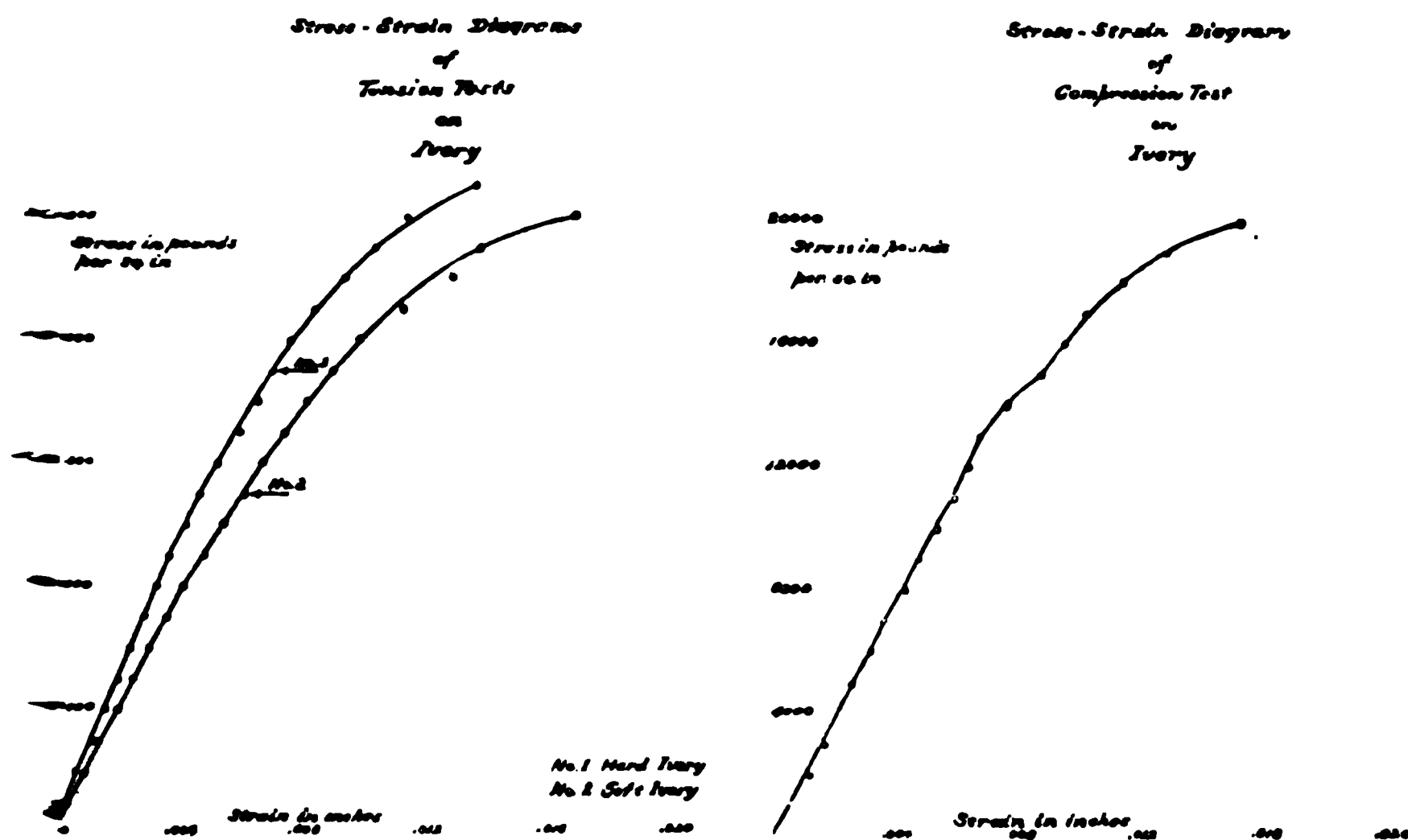
Special tests of the tensile and compressive resistance, and of the elastic properties of ivory were made for this work by Dr. James S. Macgregor of Columbia University, and he has kindly furnished the following explanation of the data given by these tests:

The specimens tested in tension, to determine their resistance to being pulled apart, were circular in form and had threaded ends. The load was applied in a direction parallel to the grain. An extensometer, which is an instrument for measuring small changes in length or strains occasioned by an applied load, was attached to each specimen during the test, and observations of elongations to one ten thousandth of an inch recorded. The curve plotted in Figure No. I shows the elongation resulting from the application of a given unit load. By forming a ratio between a load

*"The Standard Handbook for Electrical Engineers," McGraw Pub. Co., New York, 1908, Sec. 7, par. 374, p. 390.

†William Kent, "The Mechanical Engineers' Pocket Book," 8th ed., New York, 1910, p. 522.

in pounds per inch of length and the compression or elongation per unit of length, a quantity results which is termed the *modulus of elasticity*—the ratio of stress to strain. The ratio above referred to is constant up to a certain applied load, after which it gradually decreases in value. The point on the curve at which this ratio ceases to remain constant is called the *elastic limit*, the limit of deformation beyond which the body will fail to resume its previous state when the strain



TENSION AND COMPRESSION TESTS

is removed. In the same table will be found what is termed the *ultimate resistance*, which is defined as the highest load a material will carry in pounds per square inch.

The specimen tested in compression was a one and one half inch cube. *Compressive stress* results from the application to a body of two forces acting in directions toward each other. The definitions, as given above apply to the terms in the tabled results of the compression test. The curve plotted on Figure II shows the unit compressive strains or deformations resulting from applied loads in pounds per

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square inch. A notable property of ivory was its rapid recovery from a state of strain resulting from loads considerably above the elastic limit of the material.

TABLE I

MATERIAL	ELASTIC LIMIT	ULTIMATE RESISTANCE	MODULUS OF ELASTICITY
<i>Tensile Tests</i>			
Hard Ivory	9,500	22,130	2,410,000
Soft Ivory	8,000	22,010	1,975,000
<i>Compression Test</i>			
Ivory, quality not stated	13,000	24,890	1,820,000

That a comparison may be made between the results obtained from the above tests and other well-known materials, Table II has been compiled. A range of values have been given in some instances, representing the upper and lower limits of strength which might be expected from materials listed.

TABLE II

TABLE OF RESISTANCES TO TENSILE AND COMPRESSIVE STRESSES AND MODULI OF ELASTICITY OF VARIOUS MATERIALS

MATERIAL	ELASTIC LIMIT LBS. PER SQ. IN.	TENSILE STRENGTH LBS. PER SQ. IN.	COMPRESSIVE STRENGTH LBS. PER SQ. IN.	MODULUS OF ELASTICITY
Brick	No definite	.....	3 to 10 thousand	0.5 to 3 millon
<i>Iron and Steel</i>				
Cast Iron . .	No definite	15 to 35 thousand	60 to 80 "	8 to 15 "
Wrought iron	30 to 35	40 to 50 "	50 to 60 "	28 "
Mild Steel . .	40 to 45	55 to 60 "	50 to 60 "	30 "
High Carbon Steel	45 to 55	70 to 80 "	80 to 110 "	30 "
<i>Stone</i>				
Granite . . . .	.....	.....	15 to 35 "	2 to 9 "
Jade . . . . .	.....	5 to 6 "	41 to 95 "	3 to 47 "
Limestone . .	.....	.....	7 to 20 "	3 to 5 "
Sandstone . .	.....	.....	5 to 15 "	1 to 5 "
<i>Wood</i>				
Long Leaf Pine	50% of Ten. Str.	12 "	8 "	1 to 2.5 "
Spruce	" " " "	8 "	6 "	1 to 1.5 "
Oak	" " " "	10 "	7 "	1 to 2.5 "

The resilience of ivory, its rebound when falling against or being impelled against a resisting object that suddenly checks its course, is of an entirely different character from that of rubber, for instance. It has not the long rebound of this latter and so much lighter material, but its successive contacts and rebounds are quite short and frequently repeated until it finally settles to rest. The module of elasticity responds immediately to impact, and this it is that makes ivory the very best material for billiard balls, as the cue has no sooner touched the ball than the latter springs away from the impact. +

The tendency of ivory to shrink under hygrometrical influence induced the Tithe Commissioners on the Parliamentary survey to reject the employment of ivory scales. This material requires careful seasoning just as wood does, and any sudden exposure to hot dry air should be guarded against. The larger the pieces the greater the danger of such shrinkage. As a general rule ivory ornaments should not be placed on a mantelpiece beneath which there is a hot fire.* +

Because of its fine and close-grained texture, its homogeneousness and adhesive hardness, its lack of brittleness, its excellent wearing qualities and its absence of any tendency to chip easily, ivory is a most excellent substance to engrave; its smooth, even grain and the coherence of its particles lend a fine surface for the engraver's art, and the material lasts a long time. Its structure has the concentric lines that resemble the growth lines of a tree.

In China ivory has been utilized in various ways, the dust being made up into "ivory jelly." It has also been used for case hardening; ivory black as a colouring material is another by-product of ivory working. However, in recent times leather has largely replaced it both for case hardening and for the production of ivory black.

*Holtzapfel, op. cit., Vol. I, p. 152 and note p. 47.

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In Europe what is known as “green ivory”—that is, unseasoned, freshly cut material—is preferred. This is so popular that dealers will take the greatest care that it does not dry out, and to keep it unchanged they often wrap it in damp linen cloth dipped in salt and water, many folds of this being put around the ivory and not removed unless the pieces be shown to some one, when they are brought up from the cellars in which they have been stored. The preference in the United States, however, is for the white ivory, and the whiter it be the better it is liked. Its white tone is brought about by putting the material in a drawing over and leaving it there for a month or more, to prevent its cracking by a too sudden change in temperature. It may also be bleached by the use of peroxide of hydrogen.

Our chief source of supply for ivory is the African continent, and indeed a considerable part of that brought from India to Europe, known as Indian ivory, had already been imported to Bombay from an African source. Some of the very best comes from Cameroon; and Loango, the Congo, Gabun, and Ambriz, as well as the Gold Coast, Sierra Leone, and Cape Coast Castle have all been commercial sources of supply. The bulk of this material is now derived from the Congo, and this being a Belgian colony has served to make Antwerp a rival of London as a market for ivory. The French Sudan does not send a particularly good quality, the ivory being what is called in the trade “ringy” (that is, with marked alternating dark and light rings), and hence not offering the smooth, even-toned surface so much prized. A mellowness of tone and a lack of surface mottling characterize the best African ivory.* The

*The two species of elephant surviving to our day are the *Elephas* or *Loxodon africanus* and the *Elephas indicus*. Of these both the male and female of the African species are supplied with tusks, while they are only procured from the male animal of the Indian species; but little material is furnished by the Cinghalese variety, as hardly one in a hundred of them has tusks of any available size.



THE ILLUSTRATION SHOWS THE CARAVAN OF A HINDU TRADER AT ANAKUBI, BELGIAN PURCHASED FROM THE CHIEFS AT ULE. THIS CARAVAN HAD STILL TO ACCOMPLISH VICTORIA NYANZA. THE LARGEST OF THE TUSKS REPRESENTED WEIGHS 106 POUNDS



**A THIRTY DAYS' MARCH. THE IVORY CONSISTING OF 97 TUSKS FROM THE HAUT ITUBI, WAS
TO THE FRONTIER OF UGANDA, AND THENCE MARCH SIXTEEN OR SEVENTEEN DAYS TO THE
IE CONGO IS NOW IN THE HANDS OF SEVERAL NATIONALITIES.
BERT LANG, LEADER OF THE AMERICAN MUSEUM OF NATURAL HISTORY, CONGO EXPEDITION**

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Asiatic variety is denser and therefore more difficult to polish; it also changes colour more readily, becoming yellower.

A somewhat curious circumstance in regard to African ivory as a whole is that "soft ivory" comes almost exclusively from the eastern half of the continent, while "hard ivory" comes from the western part, so that there is a fairly well-marked longitudinal line separating the regions whence these two varieties come. In general it may be said that Indian ivory, while hard, is, in trade parlance, more "glassy," that is, brittle, than the African varieties. Of the latter Ambriz ivory is hard; that of the west coast of medium hardness. East Africa and Zanzibar furnish the "soft" variety. The finest translucent ivory comes from the west coast, between 10° north and 10° south of the equator.

When freshly cut, African ivory, if of good quality, has a peculiarly rich-toned transparency, due to the presence of a considerable amount of oil, and it shows but little grain or fibre. As the oil dries out on exposure the material whitens somewhat. The whiteness of the less oily Asiatic ivory lacks this special warmth of tone; moreover, it has a greater tendency to discoloration than has African ivory.* The rind, or outside covering of the tusks, offers a variety of colours in material from different sources. Thus we have in African tusks light and deep orange, hazel and brown, and even brownish black; while the rind of Asiatic tusks is lighter hued, rather fawn colour or stone colour. Sometimes the rind is only one tenth of an inch thick, and differs but little in hue from true ivory.† In selecting a tusk, chief stress is laid upon its straightness, solidity, and roundness.

The quality of ivory, its "softness" or "hardness," has been found to bear a constant relation to the habitat and

*Charles Holtzapffel, "Turning and Mechanical Manipulation," Vol. I, London, 1843, p. 144.

†Holtzapffel, op. cit., pp. 142, 145.

nourishment of the elephants. This is so marked that it has been asserted that the character of country whence the material was derived could be generally determined by examining its qualities in this respect. Thus the ivory brought from the steppes of Massai is celebrated for its softness, and it has been noted that the lower levels of the Congo basin furnish the soft ivory, while as the altitude increases the grain becomes coarser.*

That the elephant, although essentially an inhabitant of the plains and forests, sometimes finds his way to high latitudes, is shown by the observed existence of elephant tracks at a height of 10,000 feet on Mt. Kenia, British East Africa. The limit of the growth of timber and bamboo is well beneath this level. The writer who records these observations gives it as his opinion that credence can be accorded to the reports of some African natives that elephants have occasionally wandered almost up to the snow line, which in Equatorial Africa cannot be placed lower than 15,000 feet.†

Another source of ivory which has been actively exploited is furnished by the fossil remains in Siberia, more especially in the Liakhovian Isles, in the Polar Sea. Some of this fossil ivory also comes from frozen Alaska. Here are found the bones of mammoths and mastodons which perished thousands of years ago, in the later geological period, and the enormous number of these mammals once existing in this region is proved by the almost inexhaustible character of the deposits, which show no signs of depletion, although recourse has been had to them during the past two centuries. The quality of this Siberian ivory is, however, far from constant, although some of it is surprisingly good, as perfect in fact as though the bearer of the tusks had recently died.

*"La Belgique Coloniale," Vol. II, p. 618 (1897), and Vol. I, p. 93 (1895-96).

†Richard Tjader, "The Big Game of Africa," New York and London, 1910, p. 55.

This is due to the non-conducting properties of the material, and also to its preservation frozen in ice for many thousand years. In fact, one mammoth was found with skin and flesh so well preserved that it was traced by following the dogs who had eaten of it for years. The first notice of these remains was given by natives in 1799, when the body was probably still nearly or quite intact, but when Adams secured it, in 1806, much of it had been eaten, and the tusks had been removed by a native. In all some dozen remains in this condition have been found in Siberia, the earliest being discovered in 1787 in the Alasega River.*

However, only about 15 per cent. of this ivory is of very good quality; some 17 per cent. is fairly good, but the remainder is worthless.† Fossil ivory when scraped emits a fetid odour, due to decomposition and the presence of sulphurated hydrogen gas. Holtzapffel notes the finding in these Siberian fields of a tusk weighing 186 pounds, which was cut up for piano keys.‡ An interesting circumstance connected with the finding of these fossil remains is that, in 1722, Peter the Great gave orders to the provincial governors of the region to make diligent search to secure a complete skeleton of the extinct mammal.

Mammoth ivory is found along the banks of the streams flowing into Kotzebue Sound, Alaska, more especially the Kowak, Buckland, and Selawik, in Eschscholtz Bay, etc. The deposits, which are uncovered by freshets and the recession of ice cliffs, include both teeth and tusks, some of them still in very fair condition, though many are black and hard. Decayed mammoth ivory of a bluish hue is sometimes ground up by the Eskimo and used as a pigment for

*Lydekker, "The Royal Natural History," Vol. II, London, 1894, p. 544.

†Lydekker, *op. cit.*, Vol. II, p. 545.

‡Charles Holtzapffel, "Turning and Mechanical Manipulation," Vol. I, London, 1843, p. 138, note.

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decorating masks, beluga hats, finger rattles, etc.; in other cases the material is worked up into ladles, spoons, skin scrapers, and the like.*

The group known as the Liakov Islands, the principal ones being Liakov's Island, Moloi, and Kotelnoi, was named by order of Empress Catherine II of Russia, for the discoverer, a fur hunter, who landed on one of these islands in 1770. Examination of the soil revealed the presence of enormous deposits of fossil ivory. Subsequent exploration resulted in the discovery of the other islands of this group, all presenting similar conditions. Indeed, to some of these early explorers it almost appeared as though the islands were built up out of these fossil remains. When the ice-covered sand cliffs were thawed by the summer sun, the surface would slip down, bearing along great quantities of mammoth tusks and bones. In 1806 Sirovatskoi discovered the island later known as New Siberia and several others in its vicinity. New Siberia proved to be the richest of all these islands of the Arctic Sea in fossil remains, and we learn that, in 1809, 10,000 pounds of fossil ivory was taken thence, while in 1821 the production rose to 20,000 pounds; the supply seemed to be inexhaustible.† It has been noted that the ivory taken in New Siberia is whiter than that from the mainland of Siberia.

Various theories have been advanced to explain the presence of the mammoth remains in such extraordinary abundance. It is supposed that geological changes, the sinking of the land, gradually forced these mammals to the higher ground, and finally to the tops of the hills, which had become isolated from the mainland as islands. There being little means of subsistence left for the animals, they per-

*Communication of G. T. Emmons, of Princeton, N. J.

†Rev. D. Gath Whitley, "The Ivory Islands of the Arctic Ocean," in the *Journal of the Transactions of the Victoria Institute*, Vol. XLII, pp. 35-57, London, 1910.

ished in great numbers. However, we are usually taught to regard geological changes as extremely gradual, so gradual that the adjustment of living organisms to the changing conditions is greatly favoured. Here, however, many of the observed facts would rather seem to point to some sudden and unexpected cataclysm. As great an authority as Darwin confessed that the problem presented by the discovery of almost perfectly preserved remains of the mammoth in the far north was insoluble for him, for to insure the preservation of the flesh the bodies must have been enclosed in the ice from a period closely following that of the animal's death. In certain cases an autopsy revealed the presence of undigested food in the stomachs, and also of twigs and leaves from growths that are now to be found only in southern Siberia, far to the south of the site of these deposits. This also seems to point to some sudden and violent catastrophe. Another curious circumstance is that after storms tusks and bones of mammoths are washed up by the waves and cast upon the shores of the Arctic islands, thus showing that the deposits extend for a considerable distance along the bed of the ocean.*

A very early record of the exploitation of the fossil ivory deposits in Siberia is given by the Jesuit priest and missionary, Philippe Avril, who journeyed through Europe and parts of Asia in 1685 and subsequent years, his travels occupying six years in all.† The description of his experiences, published in 1692, recounts that from an Asiatic region on the River Lena, toward the Arctic Ocean, was brought an ivory exceeding in beauty that from India, since it was at once much smoother and whiter. The tale ran that this Arctic ivory (from the Siberia of to-day) was not

*Ibid., p. 56.

†Philippe Avril, "Voyage en divers états d'Europe et d'Asie," Paris, 1692; see pp. 208-211.

furnished by elephants, as the climate was much too cold to admit of such animals living there, but came from "other amphibian animals, to which the name behemoth was given." Possibly the name *mammut* was either mistaken for or corrected to the Biblical "behemoth" by the Jesuit priest, and the fact that the fossil ivory came from the mouths of the rivers or from the coasts of certain islands in the Arctic Ocean may have given rise to the vague rumour that the animals whence the tusks were derived were actually existant as amphibia. However, another explanation appears to be more probable. Father Avril states that he saw several of these teeth in Moscow and that they were "10 in. long and 2 in. in diameter at the base." These were, of course, walrus teeth, not fossil mammoth ivory. The animal itself is described as being as large and formidable as a crocodile, and the teeth not only furnished beautiful ornamental material, highly prized by Turks and Persians for sword and poignard hilts, but also possessed strong remedial virtues, especially for stopping hemorrhages. In any case the Jesuit probably heard of both forms of ivory, fossil mammoth and walrus, and supposed that both proceeded from a single living animal species.

One of his informants, the Vaivode of Smolensk, named Mushin Pushkin, had elaborated a theory that the peopling of the American continent was due to the hunting of these animals. In order to secure them, the hunters, who frequently took their families with them, would often be forced to go out on the ice, far away from the coast. Now it frequently happened in the early spring that a sudden thaw would split up the ice, so that immense pieces would become detached and float off into the sea, sometimes bearing away a party of hunters who had been caught unawares by the thaw. These might in some cases be able to escape; in others they would be borne away, helpless and hopeless,

to die of cold and hunger. The Vaivode, however, thought it not unlikely that some of these ivory hunters with their families might have lived long enough to drift on to the northern part of the American continent. Possibly he believed that they had laid in as a preparation for their hunting a sufficient stock of provisions to support life for a considerable period.

The finding of fossil ivory in parts of Thuringia and Bohemia was asserted by some of the seventeenth-century writers, but others again considered these bone deposits to be horns of the fabled unicorn. Daniel Sennert, Professor of Medicine at Vratislav, writing in 1618, attempts to establish a distinction between these two kinds of bone or bones. The genuine unicorn horn was hard and dense in structure, so much so that it could scarcely be scratched, much less polished; neither did it adhere to the tongue. This proved that the bone fossils in question were quite different, for they were rather soft, as though calcined, could be easily fractured or polished, and adhered to the tongue just as would any clay, or the famous "terra sigillata." In any case, Sennert is not indisposed to credit the fossil bone with important curative properties. It would afford help in epilepsy, malignant fevers, the plague, cholera infantum, and because it possessed these virtues was freely sold under the name of unicorn horn. Moreover, if bound on a fractured bone it would reduce the fracture, and it could also be depended upon to cure ulcers. As these bony or bone-like substances were found only in certain circumscribed districts, Sennert confesses he cannot understand why the unicorn should have existed only in these few places and not elsewhere; on the whole he inclines to believe that the seeming bones are really minerals.* Of course there can be

* Danielis Sennerti, "Epitome naturalis scientiæ," Francofurti, 1650, Lib. V, cap. 4, pp. 422 sqq.

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little or no doubt that they were in reality fossil remains of some animal or animals, the precise species being difficult or impossible for us to determine owing to the lack of a more exact description.

It appears that certain rodents have occasionally treated ivory as a food product. This is because of the grease or fat present in some kinds of tusks. Certain African tusks, found embedded in the soil where they have lain for many years, have been seriously damaged by the attacks of one or more of the gnawing breeds of animals. Similar conditions have sometimes been noted in the case of the fossil ivory of Siberia and Alaska. This has also been known to happen on shipboard where rats have gnawed tusks which were being transported to Europe or America. The point of the tusk, as the most vulnerable point, is generally the part that is found to have been damaged in this way. A buried tusk has sometimes been encountered, having a passage gnawed quite through the tusk, a part of which is thus open at both ends. As a tribute to the good taste of these rodents, we are told that one dealer at least expressed a preference for tusks that had been slightly gnawed, this fact affording proof that the tusk in question was of softer texture than the others, more or less greasy ivory being of a softer hue and possessing greater translucency, and being thus better fitted for certain kinds of work, such as flower work, for instance, especially for roses; for the rich, warm yellow of this ivory imitates wonderfully well the hue of the finest yellow roses. Hence the term "rose ivory" has been bestowed in some countries upon this variety, which was in great demand during the period from 1840 to 1860 when carved ivory roses enjoyed such a vogue. With some German ivory carvers this period was denominated the "Rosenzeit."*

*Communication of Mr. F. R. Kaldenberg. An example cited in illustration is pronounced by Dr. Richard L. Lull to have been gnawed by a rodent similar to the American muskrat, *Fiber zibethicus*, as its teeth fit quite well into the grooves.

CHAPTER VII

WORKING OF IVORY

THE operation of dividing up the tusk into workable material requires much skill and thought, and also long practical experience. Beginning with the hollow end of the tusk the cutter first removes that part of the base lacking the requisite thickness, and then arranges the sections to be cut, according to the progressive changes in its shape and solidity as he advances in his task. This refers to rectangular work of all kinds. Flat work should be cut on a line with the curve, as otherwise the edges of the rings will show. The only waste in cutting should be along the passage of the very thin blade of the saw, which is commonly from 15 to 30 in. in length, $1\frac{1}{2}$ to 3 in. in width, and but 1-50 in. in thickness; it usually has five or six teeth to the inch.*

To avoid waste of material, blocks should be centred in the lathe as near to the convex side as possible. In rough-turning a block it should be carefully adjusted in the lathe between the prong chuck and the poppet head, its position being gradually changed by light taps on either end. When it is revolving slowly the most prominent points are attacked by the tool. As the cutting of large pieces involves very great waste, blocks exceeding from 4 to 6 in. in length are rarely made. In cutting rings from the hollow part of the tusk, the hollow is often plugged with a piece of

*Holtzapffel, op. cit., Vol. I, pp. 146-148.

dry wood to keep the piece circular; the rings are then cut from both ends, the two cuts meeting in the middle.*

It but very rarely happens that a cross-section of the tusk forms a perfect circle, or is perfectly round, the form generally approximating an ellipse. The tusks are hollow for about one half of their length, the thickness of the solid part growing gradually greater until the tusk becomes a solid mass. The degree of curvature varies much, some tusks forming an almost perfect semi-circle, while others barely constitute the sixth part of a circle. Usually the curve is in one direction only, but very occasionally it is in two directions.†

If properly executed, turned-work ought not to need much polishing. For this emery paper or fine glass paper may be used, after which the surface can be rubbed with a mixture of whiting and water applied with a bit of very thin wash leather; the surface should then be cleaned with clear water. Finally, a very little oil may be applied.‡ To attach ivory to ivory or to wood a preparation of isinglass, sometimes called "diamond cement," is often employed.

To scrub ivory with Trent sand (a very fine sand) and water serves to rub away the old surface, and this would be likely to do considerable injury to any finely carved work. The best means of preserving the original colour has been found to be exposure to the light under a glass shade.**

A noted ivory worker of Copenhagen, Spangler, made the discovery that ivory objects would retain their whiteness indefinitely if placed under glass, to protect them from the air, and freely exposed to the effects of light. The present

*Holtzapffel, op. cit., Vol. I, p. 147, 149, 151.

†Holtzapffel, op. cit., Vol. I, pp. 142, 144.

‡Holtzapffel, op. cit., Vol. III, p. 1067; Vol. I, p. 154.

**Holtzapffel, op. cit., Vol. I, p. 153.

riter believes that this may possibly be due to the exclusion of the ultra-violet rays by the hard flint glass, and that it may be the actinic rays that affect ivory even more than does the air.

Very thin, pliant veneers have been cut in spirals out of solid block of ivory by means of a feather-edged veneer saw, and some years ago a Monsieur Page patented a process for such work. He produced pieces 17 by 38 in., and asserted that he could make much larger pieces, up to 30 by 50 in. The excessive thinness—1-50 in.—and the transparency of this veneer renders it not very well adapted for application to wood, etc., as the material beneath would show through to a certain extent. As material for the painter's art, however, it might answer better.*

The buyers for the billiard-ball manufacturers visit the markets in London, and formerly they went to the great ivory mart Antwerp as well. The tusks are sold in lots, and out of fifty constituting such a lot perhaps a dozen will be considered suitable for ball cutting; sometimes, however, only four or five or even but one or two may answer the purpose. Hence a careful examination of each tusk as to its adaptability is requisite, since the entire lot must be purchased and the unavailable tusks will have to be disposed of at a lower price than the average cost of the lot. What is known as "sand checking" or sun drying are tests frequently employed.

The depth of the hollow part of the tusk is ascertained by means of a straight steel rod, 16 or 18 in. in length, with a transverse handle. This handle is firmly held, and the steel rod is introduced into the hollow and passed up to the end; it is then taken out, the depth of the hollow being noted and the rod laid along the outside of the tusk, so as to show the point where the solid part begins.

*Holtzapffel, op. cit., Vol. I, p. 154, note.

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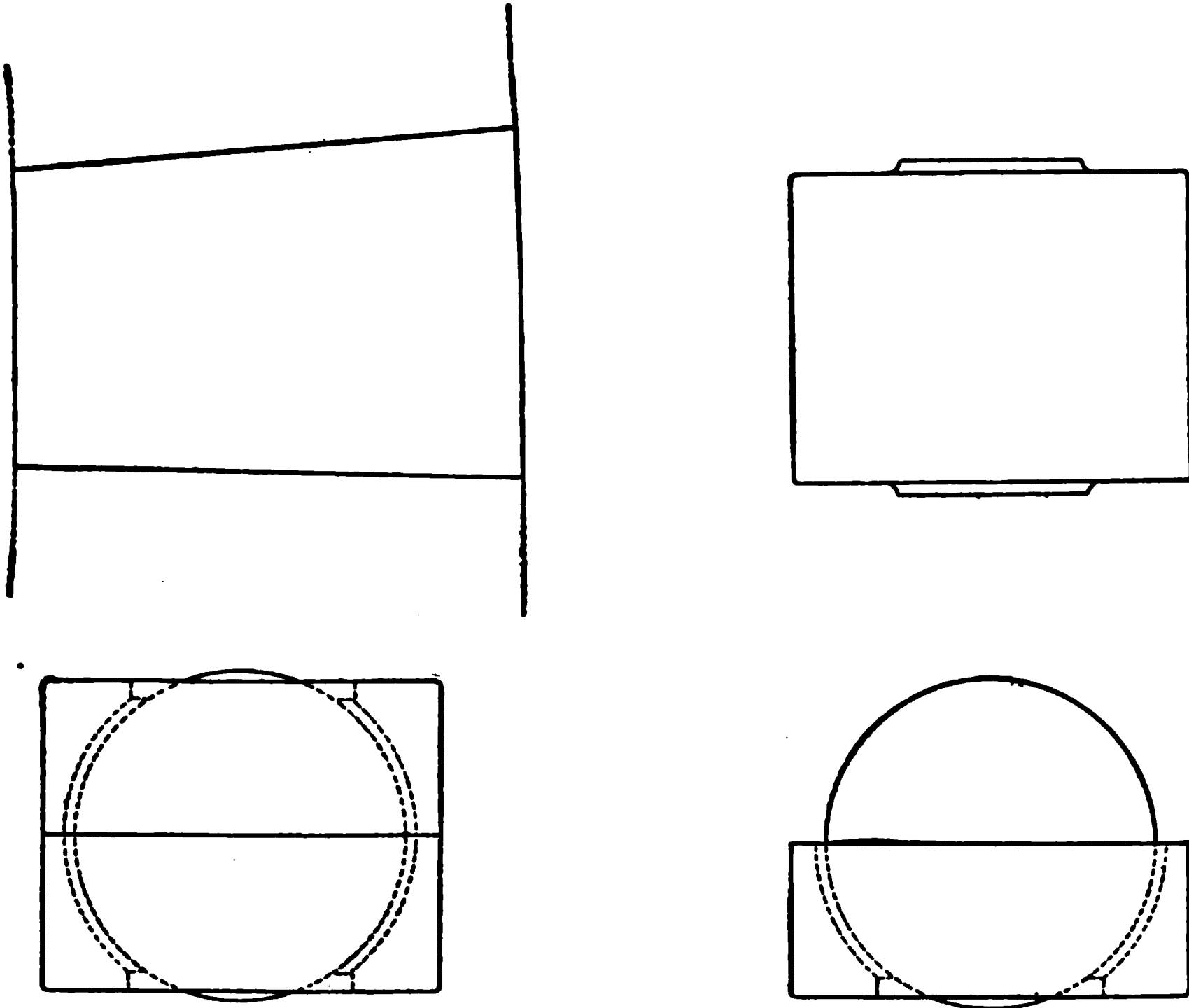
The measurers have, however, to be on their guard against a trick practised by some dishonest natives or intermediary dealers, who fill up from 2 to 6 in. of the hollow with lead, at once causing the solid part to appear to be longer than it really is, and increasing the weight of the tusk several pounds. The lead costs but a few cents a pound, but the apparent ivory weight is paid for at the rate of two or three dollars or more per pound, and the finest ivory is often at the broadest end of the tusk.

When the billiard balls are to be cut the hollow end of the tusk is sawed off entirely, leaving only the solid portion; this is then carefully measured into sections, the location of the centre or nerve part being duly noted.

The edge of the tusk is then chiselled off at the end, so that the section can be held in a chuck; when it is firmly inserted therein and is made to rotate, a long tool with one quarter circular end is placed in a chuck and held up against the rapidly revolving ivory. This tool cuts a semi-circular groove on the block. When it reaches the centre it is reversed, leaving the core loose and non-adhering. All the while the tool is cutting the ivory a jet of water is sprayed upon it, preventing it from heating or cracking. After the cutting of the ball has been completed, so that it remains quite loose in the ivory block, this is divided and the sphere released. It is then covered with shellac and seasoned for from eighteen months to two years, according to the requirements of the dealer's trade.

Even after balls have been seasoned for as long as two years, it has happened that one would be tried and found perfect at 5 P. M. and yet would have shrunk out of true by 9 P. M. As this is usually due to temperature changes, it has been found absolutely necessary, at the great tournaments, to keep the temperature of the hall constant at 72° or 73° Fahrenheit, to prevent the balls from cracking.

and thus perhaps jeopardizing a player's chance of success. The ball is usually tested by propelling it down an incline to strike a cushion at the other end and rebound upward again.



THE CUTTING OF A BILLIARD BALL—Section of elephant tusk from which the ball is to be cut; section rounded out for cutting; the dotted lines show the path the saw follows in cutting out the ball; when the cutting has been completed inside the squared section this is divided into two parts, freeing the cut ball.

Although extremes of temperature are not so serious for ivory as a sudden draft, still at the docks in London, where the ivory consignments are stored, explosions are occasionally heard as loud as pistol shots, when a sudden change of temperature manifests itself.

It not infrequently happens that although the section

to be cut seems absolutely perfect, yet when the sphere is turned it may be found that it contains some cavity, due either to imperfect growth or to disease of the tusk, or there may be a small soft area known as a "bean," and this may very seriously diminish the value of the ball.

As first turned out, billiard balls are not made exactly round, one axis being made somewhat shorter than the other, as the greatest shrinkage does not take place in the diameter, but in the length of the tusk. Thus a ball having a minor diameter of $2\frac{1}{2}$ in. and a major diameter of $2\frac{3}{4}$ in. will, at the end of two years, have shrunk into a perfect sphere with a diameter of $2\frac{1}{4}$ in. The balls generally sold in the American trade for the pocket-billiard gavel game are from $2\frac{1}{4}$ to $2\frac{5}{16}$ in. in diameter; the standard balls of the United States have diameters of $2\frac{3}{8}$ or $2\frac{7}{8}$ in., whereas, for Cuba and Latin America they are $2\frac{1}{2}$ in. in diameter or something larger.

Balls having brown or black spots, due to the natural colour of the outer layer or "bark" of the tusk, are less valuable than those of homogeneous colour. These discolorations are due to the fact that the balls in question have been cut from sections of tusk barely wide enough to allow the requisite diameter for the ball, so that a little of the outer layer remains on the sphere. Other deteriorating marks may result from the drying and bleaching processes, the ivory of the tusks becoming thereby either "sand checked" or "sun checked," as it is called. These "checks" are tiny markings or cracks running perpendicularly along the "grain" of the ball. It may here be remarked that neither the discolorations nor the "sand checks" affect the playing quality of the ball; indeed, it has been claimed by many that a "sand-checked" ball is less subject to changing climatic influence than an unmarked ball, because ivory of this kind is generally well seasoned.

As a nerve runs through the centre of the entire length of a tusk, it is imperative that this be always in the centre of the billiard ball. The purer, finer balls are those in which the outer crust or bark of the tusk can be entirely removed before the ball is turned; when this cannot be done and discoloured spots or stripes are present the ball will be worth but \$9, while a clear ball will command a price of \$16. Of the so-called "check balls" there are three grades, "A," "B," and "C." Grade "A" with but a single check sells for \$10 or \$12; Grade "B," with five or six checks, for \$9, and a ball of Grade "C," with six to twelve checks, will not bring more than \$6.

Formerly the small ends of the tusks were sold for harness trimmings, but these are now made of celluloid, and the "tips" have been of late sent to Hamburg, Germany, for distribution throughout the Orient.

Previous to January, 1914, before the new tariff came into force, billiard-ball manufacturers imported the entire tusk, but as the duty is now 20 per cent. and the "hollow ends," as they are termed, represent from 20 per cent. to 30 per cent. of a tusk, or even more, these are now cut off abroad and only the compact parts, measuring from $2\frac{1}{2}$ to 4 in. in diameter, are imported. The large fine centres are worth \$3.50 a pound, whereas the "hollow ends" are worth little more than \$2 or \$3 a pound, and tips may sell for only \$1 a pound.

Formerly only tusks of from $2\frac{1}{2}$ to 3 in. in diameter were freely used, but now, owing to the scarcity of this "ball material," tusks up to $3\frac{1}{2}$ in. and 4 in. are used. This entails greater cost as the two rings resulting from the cutting of each ball are naturally larger and much heavier, and have to be returned to India and other Eastern countries to be worked up into bangles and the smaller ornaments of various kinds. The difference in waste

material is shown by the fact that a large tusk may furnish only one half its total weight in balls, while in the case of a tusk, the diameter of which but very slightly exceeds the standard diameter of a ball, only from 20 per cent. to 30 per cent. of the material will be lost.

As we have noted, the finest balls—first-class material—are retailed at about \$16 for each ball. There are three of these in the modern game, while in the older game four are used; in pocket billiards, or “pool,” sixteen balls are used. However, the balls for this latter game are frequently made of some of the substitutes for ivory; otherwise, since fifty balls are sold for pool to a single one for billiards, the ivory supply would prove so far short of the demand that an ivory ball would soon be worth \$75 instead of \$16 as at present. Soft ivory is almost exclusively used in the manufacture of billiard balls for the American and European markets, if we except the case of some South American countries where the trade occasionally demands hard ivory, under the impression that climatic changes favour its use in those latitudes.

As it is of supreme importance that the centre of each ball shall be the true centre of the tusk from which it is cut, it is eminently desirable that the tusk's diameter should not greatly exceed that of the ball; sometimes a smaller ball will be cut from the centre of a larger one. It was found by actual experiment that if a number of balls were cut from a large tusk, that is to say, two, three, or four, from an exceptionally broad tusk, none of them having a centre corresponding with the centre of the tusk, the ivory material did not have an equal density, and while possessing the normal resiliency did not have the true rebound. It was found that no true and accurate shot could be made with such a ball, and although the expert billiard player, Slosson, greatly admired these balls, their appearance

being very good, he still found that they were absolutely useless, since even he could not make them respond as was possible with a properly cut ball.

In connection with the resiliency that makes ivory such an indispensable material for the billiardist, we may note that this quality has been recognized recently by golf players at whose request a circular disk or thick button of ivory is sometimes put in the head of the driver. It has been found experimentally that mammoth ivory is poor material for billiard balls, as it has lost to a considerable extent the resiliency so characteristic of ivory. Some good judges have regarded the bleaching which is generally resorted to in order to impart a dead-white hue to the balls as detrimental to their quality, since it dries out the gelatine to a noticeable extent, and is apt, in this way, to modify unequally the natural density of the ivory.* For billiard balls of superior quality, one of the centres of manufacturing is New York City.

The relative structural uniformity of ivory billiard balls and those made of celluloid has been tested, the latter having been rendered equivalent in specific gravity by the addition of filling materials. The test was made by placing the balls in a cup of mercury to which a small quantity of benzol had been added; when placed in this solution the celluloid ball floated without turning, while the ivory ball gyrated somewhat before coming to rest, this showing that its centre of gravity was not exactly in the centre of the sphere as was the case with the celluloid ball. Nevertheless, celluloid balls do not "take the cue" as ivory balls do, and also lack many other of the special qualities of the latter. It is claimed that balls made of the synthetic composition "bakelite" are even superior to those made of ivory.

*Alfred Maskell, "Ivory in Commerce and in the Arts," Cantor Lectures (Lecture III), *Journal of the Society of Arts*, Vol. LIV, No. 2817, November 16, 1906, p. 1177.

When we consider the value and the peculiar natural shape of the elephant tusks, we can well understand that the manufacturer of piano keys is obliged to exercise particular care in the selection and the economical management of the ivory he uses, so that in dividing the tusk the largest part possible may be utilized, and the slight inevitable waste be reduced to a minimum. A tusk of the proper size and quality having been chosen, it is first cross-cut, commonly either at the top or the hollow, into a number of sections, each 4 in. in length, and in view of its curve, this can only be accomplished by cutting out a smaller wedge-shaped piece between the sections, so that each 4-inch section shall offer a straight piece of ivory. This is of the greatest importance so that the section shall run absolutely parallel with the nerve of the tusk. An expert worker then marks out on each separate section at what point it is to be sawed through, so that the greatest number of "heads" and "tails" (the broad and narrow parts of the key) can be secured. The sections are then sawed apart into a number of broader pieces, 2 in. in length, and narrower pieces 4 in. in length, as indicated by the markings, and each of the separate pieces is divided into the respective parts of the key, the broader "heads" being 2 in. long, and the narrower "tails" 4 in. long, the slices being so thin that from sixteen to twenty are produced from each inch thickness of ivory; the "tails" are thinner at the end farther from the "heads" than at the end nearer to these. For this latter delicate operation very finely tempered and carefully made circular saws are requisite, and they are kept constantly moistened by passing through or being fed with water, to reduce the heat generated by friction. To avoid serious waste in ivory cutting great care has to be taken to keep these saws in perfect condition.

When the "heads" and "tails" have been sawed off,

they are put in water to soak, at various temperatures and for various lengths of time, this depending upon the special condition of the tusk that has been cut up. The soaking process having been completed, the parts of the keys are very carefully and slowly dried out, so as to guard them from warping, "checking," or cracking. To whiten them they are then put for a time in a bath of peroxide of hydrogen, in earthen crocks 18 in. high and 14 in. across, the strength of the solution and the duration of the immersion (from 24 to 48 hours) depending upon the special conditions of the ivory to be treated. The keys are then taken out, dried, and placed on racks that are two rows wide and 3 ft. long. These racks have rows of tin slats to hold the keys in place, and are set at an angle against the glass panes of a building which resembles a greenhouse in character. The sunlight penetrating the glass bleaches the ivory in from one day to a week's time. The keys when they are dried and bleached are carefully sorted for the various qualities. They are again sorted according to colour and grain. Some are compact and slightly grained, others are coarse grained. The sorting is most expertly done by experienced young girls who sort them into lots of fifty-two. They are then ready to be placed on the piano board. The board is cut out of a piece of pine or bass wood exactly the size of the keyboard. A machine then cuts the grooves that will be ultimately removed, in which the thirty-six flats are placed. The board is now covered with glue and whitening and pressed with an aluminum plate to which glue does not adhere; the glue while hot would adhere to other metals, but does not to aluminum because it is so good a conductor of heat. When the excess of glue has been scraped off by a small steel tool, the board is placed on a flat machine and the 104 keys are laid on, fitting perfectly, and then a pressure secures them in place and the entire surface is polished.

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The intervening spaces in the board are then sawed through, the hollow spaces falling out where the sharp is inserted. The surface is polished by means of a circular felt-covered disk which is guided by hand over the keyboard. Rotten stone is used for the polishing. The small front part of the key beneath the head was formerly made of ivory, but now celluloid is used as a substitute. The saving may seem slight, but because of the immense number of pianos made and the keen competition every small saving is of importance. At manufacturer's prices the keyboard with keys sells for from \$12 to \$28 for fine quality, and rarely for over \$40 or \$50.

In normal times 350,000 sets of ivory piano keys are made in the United States. The keyboards are almost invariably 48 in. long and 6 in. wide, with 52 "heads" and 52 "tails" intervening between the 36 ebony sharps. Although weighing but 12 ounces when completed, these "heads" and "tails" require 20 ounces of solid ivory for their production. Thus it will be apparent that in normal times, as for instance in 1913, the weight of the ivory used for piano keys could reach 437,500 pounds. In 1886 the consumption of ivory for this purpose was 110,000 pounds. The use of celluloid as a substitute is very limited, amounting to 8 per cent. of the total ivory or ivorylike material used. The best ivory for piano keys is that obtained from Abyssinia on the east coast of Africa. Many tusks also come at present from Khartoum on the east side of the Congo.

Among the almost innumerable articles for which ivory has been utilized because of its exceptional qualities, we may enumerate all kinds of handles for daggers, knives, etc. These hilts, or handles, are often elaborately carved, especially the ivory dagger-hilts; we may also note the rich inlays in firearms so much in favour in the Orient. In short, no



A RECENTLY CARVED IVORY TOILET SET

material combines a greater variety of excellent qualities, and these render it equally adapted for articles of beauty and usefulness. Almost from time immemorial gold, silver, and ivory have been among the most appreciated of precious materials, a popularity which clearly indicates the presence of some enduring and peculiar quality in these substances which has given them so great a value.

Ivory is used extensively in the manufacture of the higher class of toilet articles, which are as much in favour to-day as ever before. Among the articles entirely of ivory are the following: trays, hair receivers, glove stretchers, cold-cream boxes, tooth-powder boxes, shoehorns, nail-powder boxes, hairpin stands, powder boxes, pin boxes, hatpin stands, glove-powder boxes, talcum-powder boxes, hairpin boxes, salve boxes, jewel boxes, pomade boxes, vaseline boxes. In a number of other toilet articles the backs and handles are of solid ivory; there are: mirrors, hair brushes, hat brushes, face-powder brushes, nail files, clothes brushes, bonnet brushes, pincushions, buttonhooks, cuticle knives, shaving mirrors, shaving brushes, military brushes, whiskbrooms, velvet brushes and nailscrapers, as well as fine combs. These last-named objects are often of beautiful ivory, very thin and delicate, and of exquisite workmanship. The teeth are so fine that they measure 29 to 49 to the inch, which means that they are cut singly with an automatic saw with a blade from 1-50 to 1-100 of an inch in thickness, and they sell for from 25 cents for the small combs to \$2 or \$2.50 for the large 4-in. combs.

The size of the pieces of ivory used in the larger toilet articles is frequently remarkable. Thus hand mirrors with ivory backs of a single piece $5\frac{3}{4}$ in. wide, and more than $12\frac{1}{2}$ in. long to the end of the handle, are occasionally met with, and there are also circular hand mirrors $6\frac{1}{4}$ in. across and $9\frac{1}{2}$ in. to the end of the handle. These are all won-

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derful specimens of clear, unbroken ivory. Jewel boxes are also to be seen measuring 7 in. across, cut from the hollow end of the tusk, this representing a little less than the diameter of the tusk used, as the requisite shaping and polishing have necessarily removed a little of the original material. Many of the toilet boxes have widths of from 4 in. to 6 in. Frequently the ends of so-called "scrivello" tusks (those weighing less than from 6 to 10 pounds) are flattened out at the broader end so as to form paper cutters, and are found to be very effective for this purpose.

Principal uses to which ivory was put, average for years 1889-93, weight in kilograms:*

FOR	ENG.	AM.	GER.	FR.	OTHER COUN.	TOTAL
Knife-handles .	143,000	11,000	13,000	9,000	1,000	177,000
Piano keys . .	14,000	62,000	57,000	29,000	....	162,000
Combs . .	16,000	21,000	23,000	31,000	....	91,000
Billiard balls .	9,000	13,000	12,000	14,000	1,000	49,000
Miscellaneous .	6,000	9,000	8,000	7,000	4,000	34,000
	188,000	116,000	113,000	90,000	6,000	513,000
Consumption in India						121,000
" " China						13,000
Grand Total						647,000

Official returns for 1905 make the value of the "ivory and keys, including keyboards" manufactured for pianos during the year amount to \$2,048,795, representing about 18 per cent. of the cost of the materials used in making pianos. The principal seats of the piano-key-making industry are at Ivoryton, Conn., Tonawanda, N. Y., and Cambridge, Mass., in the order named. For organs the item "ivory and keys, including stops, knobs, tremolos," etc., totalled

*"La Belgique Coloniale," Vol. I, p. 93, 1895-6.

\$185,680 during 1905.* The same authority puts the number of establishments devoted to the working of ivory and bone at 39, giving employment to 874 men, 207 women, and 47 children under sixteen years.†

In France the total value of the ivory annually used for industrial purposes at the present time has been estimated to be as follows:

	FRANCS	DOLLARS
Ivory combs	400,000	80,000
Billiard balls	800,000	160,000
Piano keys	400,000	80,000
Toilet articles, brushes, knife-handles, etc.	400,000	80,000
	<hr/> 2,000,000	<hr/> 400,000

While the greater part of this ivory is secured at the sales in London, Antwerp, and to a lesser extent in Hamburg, a certain quantity is brought from Abyssinia and the Sudan by way of Marseilles and Bordeaux.

Of the French firms engaged in ivory manufacture, we may note for ivory combs, Gasteclau et Fils, of Paris, and Jeuffroy, of Ezy (Dept. Eure); Cleret, of Ivry-la-Bataille (Dept. Eure), and Lesœur, also of Ivry-la-Bataille. For billiard balls, the principal manufacturers are Grillet, père et fils; Gobin, père et fils; Marye, père; and Henin aîné, all of Paris. To these we may add the three firms, Grillet, père et fils, and Couesnon, of Paris, and Thihezart, père et fils, of Ivry (Dept. Seine), for piano keys. Knife-handles are made by Limousin and Thinet, both of Paris, and fancy goods and minor art objects by the Parisian firms Lefort Frères, Des Quesnes, and Braissart. The chief importing houses for ivory are Grillet, père et fils, Zilcot & Ekeinstrin, and Gobin, père et fils.

To render ivory ductile all grease should first be removed

*Dept. of Commerce and Labour, Bureau of the Census, *Manufactures, 1905*; Pt. IV, *Special Reports on Selected Industries*, Washington, 1908, p. 250.

†Ibid., p. 720.

by the use of pure benzine. This having been done, the ivory is to be immersed in boiling water for from 15 to 20 minutes, according to the thickness of the specimens treated, the length of time requisite in each particular case being determined experimentally by an actual test of the degree of softness acquired. Care must be taken to avoid an unduly rapid or irregular drying out of the material. Where resort has been had to the phosphoric-acid treatment of ivory plates, etc., to secure flexibility, the separate pieces must not be allowed to come into contact with one another while they are being again hardened in warm water.*

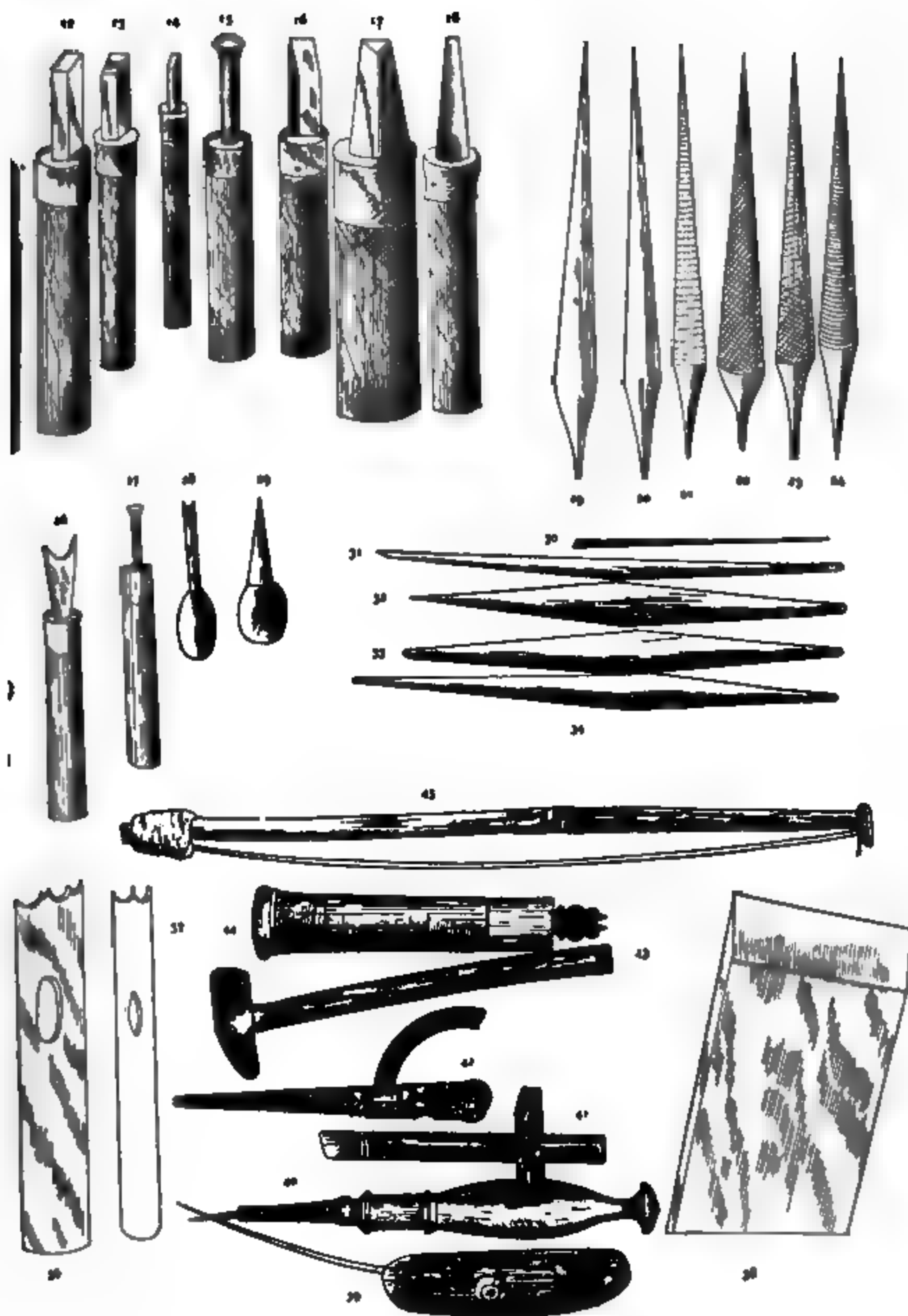
A most interesting instance of the use at a very early period of a moistening agent for the protection of ivory from splitting or cracking, as a result of undue dryness, is furnished by an ancient author, who states that because of the dryness of the air in Athens, especially on the heights of the Acropolis, it was customary to sprinkle water at intervals over the great gold and ivory statue of Athene Parthenos by the immortal Phidias.†

The simple tools with which the Delhi ivory carvers execute their very excellent work and of which the forms are shown in the accompanying plate, are as follows:‡ 1, 2, 3, the *ári*, or saw, used for cutting through the "bark" of the tusk, for cutting it off, and for the final cutting of the ivory into pieces of requisite size, respectively; 4, the *kenchi*, for cutting the thin sheets of ivory into strips; 5, the *chhuri*, or paring knife, used to prepare the work for carving; 6, the *chhuri*, or finishing knife, for preparing the work for the operation of turning and rounding off the edges; 7, the *sohan*, or file, used only for finishing larger work; 8, the *sohan*, or rasp, with which the rough edges of holes are

**Scientific American*, Supplement No. 1886, p. 128, February 24, 1912.

†Cited in Rodigini, col. 886. See also pp. 23, 24 of the present work.

‡T. P. Ellis, "Ivory Carving in the Punjab," the *Journal of Indian Art and Industry*, Vol. IX, No. 75, July, 1901, pp. 48, 49.



TOOLS USED BY HINDU IVORY CARVERS Delhi, India.
 —From the *Journal of Indian Art and Industry*.

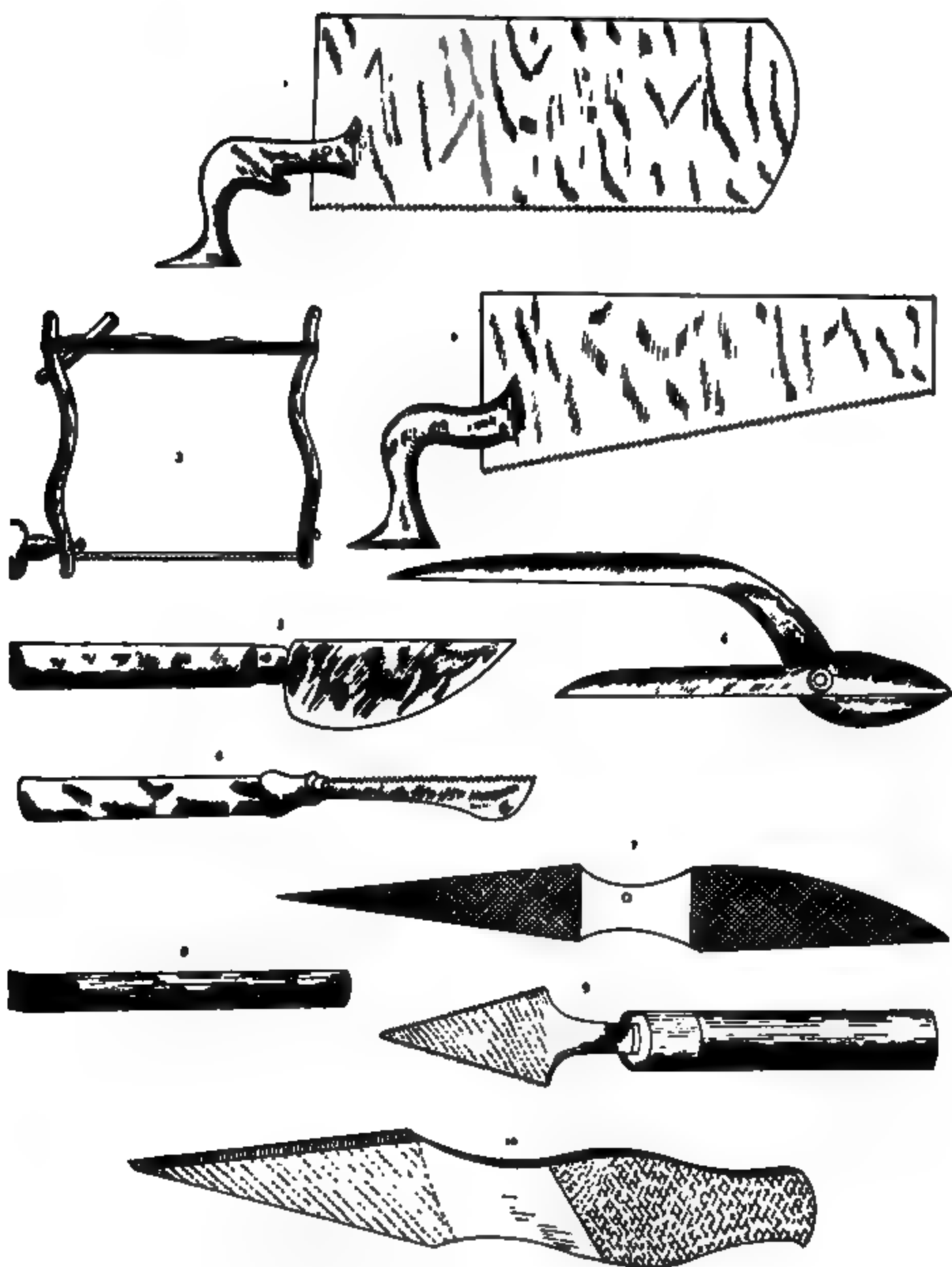
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smoothed off; 9, a flat rasp for square rough work exclusively; 10-16, *birkas*, or chisels, for making small grooves, No. 15 taking the place of our gouge; 17, 18, groovers for clearing small grooved work; 19-24, specimens of files and rasps; 25-29, various drills or *barmás*; 30-34, points and punches for removing the dust after polishing; 35-38, *randa*, rabbeting plane irons, for doing ornamental work about bases and also for beadings. The following tools are for perforation work: 39, *rethi*, or file; 40, *barma*, or drill; 41, *kath-kashi*; 42, *parkár*, or compasses; 43, *hathouri*, or hammer; 44, *parkár*, or fixed compasses; 45, a drill-bow. It will be noted that the *rethi* has a curved form, teeth being cut on either side of the flat surface with which the filing is done; the edge can be employed for cutting or filing.

The method used in turning bangles at Tando, Sind, is thus described:*

“The piece of ivory is first peeled and made clean with a hatchet. It is then fixed in a wooden frame specially made for this purpose, the ends of the ivory piece being fastened to two pointed iron bars on each side of the frame, which is called *jandi*. The ivory piece is then turned with a wooden shaft attached to a portion of the frame, and is rounded with an instrument having a sharp end, called *karmno*. The piece is then smoothed with an instrument called *mathni* and is marked into lines, round in shape, with an instrument called *baraki*. The lines so marked are then separated from the piece in different layers with an instrument called *chhino*. The first layer will bring out the largest bangles, the second layer smaller ones, and so on, the bangle of each layer being snatched up with the aid of an instrument called *putho*. Lastly, the sides of the bangle are smoothed with an instrument called *kimdho*.”

*Cecil L. Burns, “A Monograph on Ivory Carving,” the *Journal of Indian Art and Industry*, Vol. IX, No. 75, July, 1901, p. 54.



TOOLS USED BY HINDU IVORY CARVERS Delhi, India.
 —From the *Journal of Indian Art and Industry*.

The writer we have just quoted draws attention to the slowness and crudeness of the methods here employed when compared with those used in Europe, and also to the great apparent loss of material, as the chips and sawdust seem not to be utilized as they might be, and as they are utilized in European workshops. This waste of time and material constitutes a heavy handicap on the Indian workman, more than offsetting his advantage over European workers in the matter of cheap living, so that he is unable to withstand the European competition.

The making of spurious examples of antique ivory carving is an art by itself. The slight cracks that develop in old ivories are imitated in the fresh material by dipping this in very hot water and then subjecting it to the action of a hot fire; as a result the ivory fibres split and the illusion is complete. The antique "tone" is imparted by subjecting the new material to a fumigation of tobacco, tannin, or moist hay, or else resort can be had to a bath in ochre, wherein the ivory should remain for several days until the colouring matter has been absorbed. While, however, it may not be difficult to imitate general appearances in these ways so as to deceive all but thoroughly competent experts, the character and quality of the design itself will usually afford good evidence as to the genuineness of the supposed antique. Apart from this the marks of the turning-lathe, not used in early times, are also signs of fraud; this may appear in the cylindrical form of a cross or of the base of a statuette or group. In a like way the concentric rays on reliefs made by the machine on ivory boxes will infallibly betray the modern origin of the work. In the case of spurious patina, all that is requisite to reveal it is to wash the object lightly with water or alcohol; this must, however, be done with the greatest care and is often a somewhat risky proceeding, since some too thorough process of

cleaning will remove the genuine patina from a true antique, leaving it of an unpleasant modern whiteness. Of course celluloid imitations are very easily detected, either by the camphory odour they emit or by their inflammability.*

A leading American miniature painter states that the best dealers now furnish ivory sheets with the surface already prepared for painting in a manner much better than the ordinary novice can accomplish. However, if the painter desires to treat the material without trusting to the aid of the dealer, the best means of so doing is to tack the ivory sheet securely to a board to prevent it from warping, and then apply powdered pumice stone to the surface gently with a damp handkerchief. The powder should be plentifully used, first damp and then dry, until every trace of grease, or roughness, has been removed, so that the paint will flow freely and evenly. It sometimes happens in the process of painting that a part of the surface becomes greasy; in this case a little dry pumice powder, dusted over the spot with the tip of the finger, will generally suffice to correct the defect. The artist should determine the required size of his ivory before beginning to paint, and draw the precise shape on the ivory sheet, which is then to be immersed in perfectly clear, lukewarm water until the material becomes soft, when it can be easily and safely cut with a small pair of sharp scissors; if cut while dry the ivory may split and be irreparably damaged. However, an oval may be cut out with comparative safety, even when the ivory is dry, if care be taken to cut to the middle of the top and bottom of the oval, respectively, and always to follow the grain. Should it be necessary to cut the finished painting, a very sharp graver's tool is the safest instrument to use, the ivory being laid on some flat, hard surface and the part not being cut covered with a thick piece of paper so that

*Émile-Bayard, "L'Art de reconnaître les fraudes," Paris, 1914, pp. 189, 190.

the painting will not be marred by the contact of the fingertips. When mounted, the ivory sheet should never be glued to a backing, but left free so that it may contract or expand, for this material is exceedingly sensitive to atmospheric changes. For this reason also the miniature should be provided with a crystal securely attached to the backing of pasteboard or metal so that the air be excluded. Should the ivory sheet come up it may be flattened by exposure to a tiny stream of steam and subsequent pressure under a heavy press, the steam being applied to the back of the miniature and never allowed to come in contact with the painting. If this curling up occurs before painting, immersion in water and compression in a press will be sufficient, the ivory surface being protected by tissue paper.*

A cheap and effective treatment by which ivory or bone that has become yellow can be restored to its original whiteness is to place the material requiring treatment for several days in a solution of one part of chloride of lime and four parts water. Ivory needs more time to whiten than does bone. At the expiration of the required period the ivory or bone is to be washed and allowed to dry off in a current of air.†

Another bleaching process of ivory is to lay one pound weight of ivory plates in a flat vessel and pour over them five ounces of crystallized salt mixed with two pounds weight of soft, river water. The ivory should remain in the sodium solution for from 36 to 48 hours; this is then to be decanted and the ivory washed several times with cold, soft water. A solution composed of $\frac{3}{4}$ of a pound of sodium sulphate to 2 pounds of water is now to be poured over the plates, which are to remain therein for five or six hours; then an ounce of sodium acid diluted with 4 parts of water

*Communication of Miss Elsie W. Southwick Clark, of Orange, N. J.

†H. Angerstein, "Ueber das Bleichen der Knochen und des Elfenbeins," in *Mittheil. des hannov. Gewerbsvereins*, 1855, Heft III.

must be added gradually, the mixture stirred well and the vessel covered with a tight-fitting cover, and left undisturbed for 36 hours. The liquid is then to be poured off, and the plates are to be rinsed in water and left to dry in the air. Should the desired result not be obtained the first time, the operation can be once or twice repeated.*

A process of rendering ivory semi-transparent and so modifying its structure that when placed in hot water or milk it becomes as pliant as leather, was in use in Paris in the forties of the last century for certain manufactures of ivory, such as artificial nipples, etc. This same, or a similar process is thus described: "The articles made from ordinary ivory are to be placed in a solution of phosphoric acid, having a specific gravity of 1.130, and kept in this solution until the ivory becomes transparent. They are then to be taken out, washed with water, and dried with a soft, linen cloth. They will have become soft as leather, but will harden on exposure to the air; however, when placed in warm water they will again become soft and pliant."†

Because of its greater density of structure, African ivory is more resistant to the tools used in working it than is Asiatic ivory, at the same time and for the same reason it possesses the advantage of receiving a finer polish. A slight disadvantage as compared with the softer Asiatic ivory is that its density renders it less freely absorptive of oil, or of the colouring matters used in staining ivory.‡

Although it might seem that the natural hue of ivory was the most beautiful from an artistic point of view, more or less successful attempts have been made in the past, and

*Prof. Dr. Artus, "Verfahren zum Bleichen des Elfenbeins," in *Vierteljahrschrift für technische Chemie*, IX Jahrgang, p. 264.

†Elsner, "Mittel um Elfenbein weich und durchsichtig zu machen"; in *Berliner Gew.—Indust.—u. Handelsblatt*, Vol. XXVIII, No. 6, 1848.

‡Francis Campin "Das Drechseln in Holz, Elfenbein, Perlmutter, etc.," Weimar, 1862, p. 303.

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still are made, to impart various colours to the material, and we shall here note a few of the processes employed for this purpose.*

X A yellow hue may be secured by using as a stain 60 parts of finely ground curcuma root, which has been digested for a day in 500 parts of 80 per cent. alcohol, and then filtered through blotting paper. Another yellow stain is composed of 95 parts of aniline yellow dissolved in 750 parts of 80 per cent. alcohol; this solution is also to be filtered through blotting paper.

Several different red stains are recommended. In one, Brazil-wood chips are boiled in alum water and the filtered solution is then applied to the ivory, which must previously have been treated with a diluted solution of muriate of tin. A red stain may also be prepared by making a solution of 4 parts of cochineal, 4 parts of cream of tartar, and 12 parts of tin solution, the cochineal being first dissolved in warm tin solution and the cream of tartar added to the resultant mixture; as a final step, a small quantity of sal ammonia is to be gradually dropped in.

A violet shade can be obtained by first placing ivory for a few minutes in a much-diluted muriate of tin solution, and then letting it lay for an hour in a decoction composed of 50 parts of Campeachy wood and 30 parts of water. Other violet stains are given, one of them made by boiling for an hour 2 parts of Brazil-wood chips in 5 parts of water; the decoction is then to be filtered, and mixed with a solution of 12 parts of green vitriol to 25 parts of water. Lastly 1 part of aniline violet dissolved in 10 parts of alcohol, the resulting solution having been carefully filtered, also provides a good violet stain.

To stain ivory black, it may be dipped in a solution made by boiling 1 part of finely cracked gallnuts, and 4 parts

*See *Scientific American*, Supplement No. 1677, p. 128, February 22, 1908.

of pulverized verdigris, in thirty times their weight of water; this mixture is then to be filtered and reboiled. After having been dipped in this solution, the ivory is to be treated with another solution secured by boiling for an hour, and then straining, 1 part Campeachy-wood extract (tied in a linen bag), 0.5 part gum arabic, 12 parts of water, and 12 parts of alum.

The scrapings of ivory were quite frequently used as ingredients in the medicinal preparations of the eighteenth century, this *rasura eboris* being dissolved in a liquid and administered as a remedy for fever, for jaundice, and for diseases of the liver and spleen. Pulverized ivory, steamed and calcined, known as *ebur ustum* or *ivoire brûlé*, was believed to cure abdominal disorders and to check hemorrhages and leucorrhea. Calcined in a covered crucible, it became coal black, and was called by the French *noir de velours*; this preparation was employed as a hair restorer.*

The use of ivory in Roman times to remove blemishes from the skin is vouched for by both Pliny and a Latin physician named Placitus, sometimes erroneously called Iextus Platonius. The material was reduced to a powder, mixed with Attic honey, and when applied to the face produced excellent results, more especially if used daily.†

That an inferior kind of ivory was made from the bones of the elephant is asserted by Cardano, writing in the sixteenth century, although he hastens to declare that "the finest" came from the tusk. As ivory was tough, dense, and white, it was especially adapted for the manufacture of combs. It was so highly prized in his time that it was regarded as ranking with gold and gems in value, although

*Zeller's "Grosses Vollständiges Universal Lexicon," 1734, Vol. VIII, col. 788.

†Plinii, "Naturalis Historia," Lib. XXVIII, cap. viii; Placiti, "De Medicamentis ex animalibus," cap. 12.

from the quantity obtainable we might suppose that it was of much less worth.*

The Japanese ivory carvers rival or even surpass their Hindu brothers in the number and complexity of their tools. In several cases the name of the inventor of a specially adapted tool has been preserved. A recently published Japanese manual of the ivory carver's art figures all of the Japanese tools employed to-day. The manner of using one of the most important of these implements is shown in our illustration, and we have given the Japanese names in full for purposes of identification, although they must be entirely significant only to the few readers who are familiar with the rich and harmonious language of the Land of the Rising Sun.

This Japanese manual of ivory carving is such a curious and unique publication that it seems to merit a full description of its literary contents. At the outset an Imperial Privy Councillor, Count Sasaki Takayŭki, has contributed a brief rule from one of the Chinese classics to the following effect:†

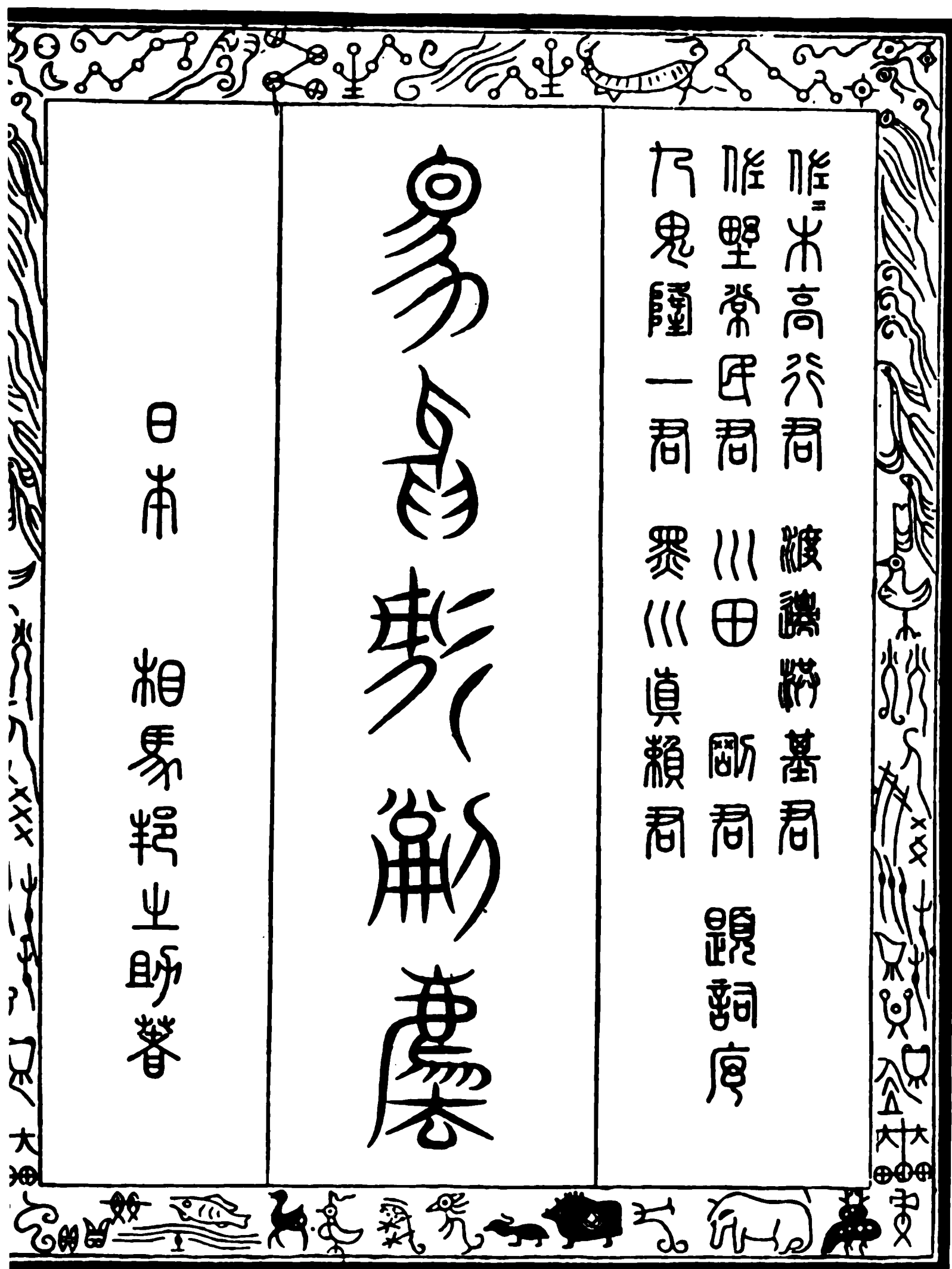
“Keep leveller and string on the left,
Keep compass and ruler on the right.”

This is succeeded by a series of brief introductions contributed by a number of distinguished Japanese, the first of these being written by Count Sano Tsunetami, also of the Imperial Privy Council, and a former minister of agriculture and commerce. He says:

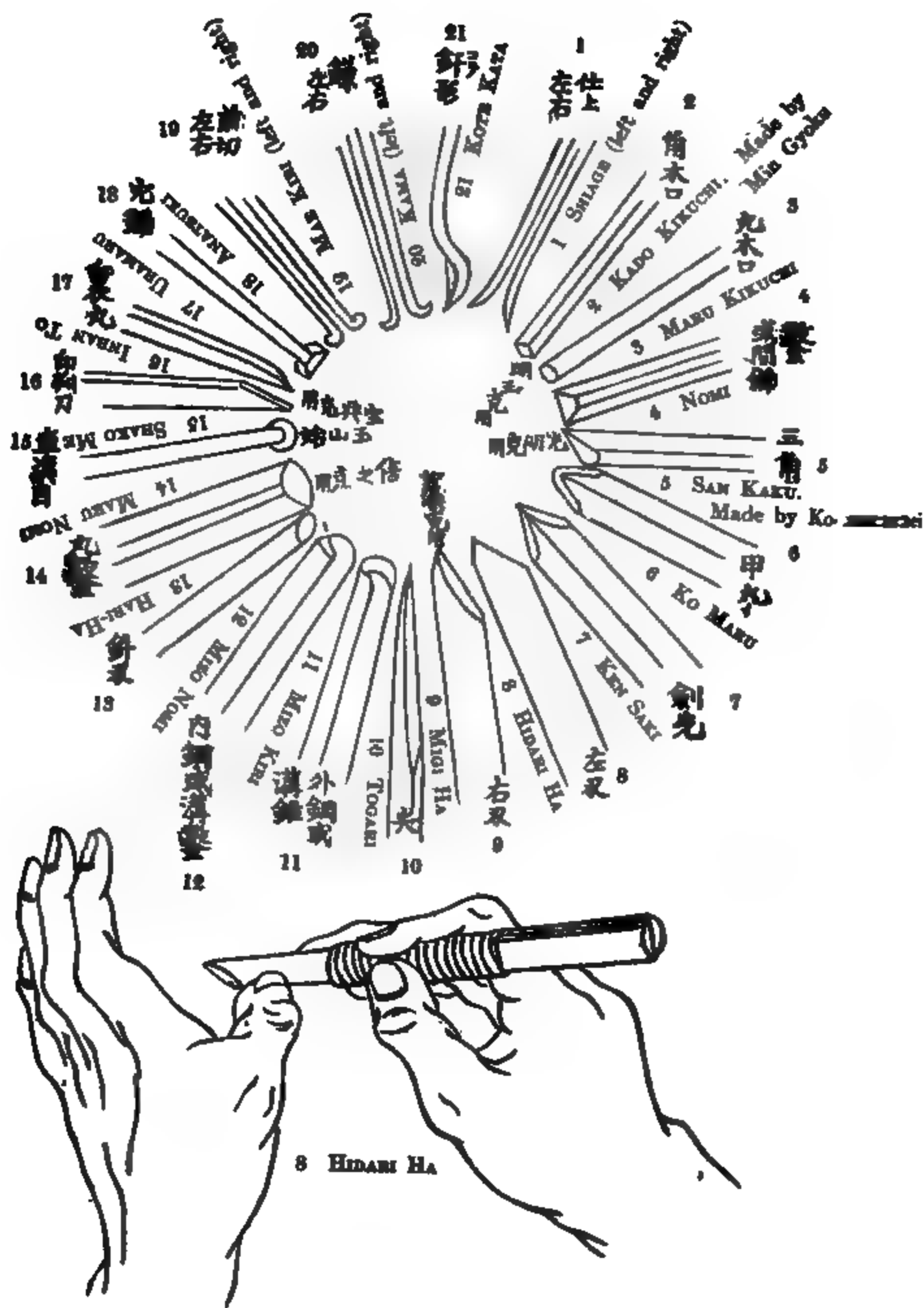
“While there are well-defined methods and perfected technical processes regarding all branches of the arts of painting and carving in our country, yet from ancient times we have had to depend solely for our instruction upon

*Cardani, “De subtilitate,” Basileæ, 1554, pp. 309, 310, Lib. X.

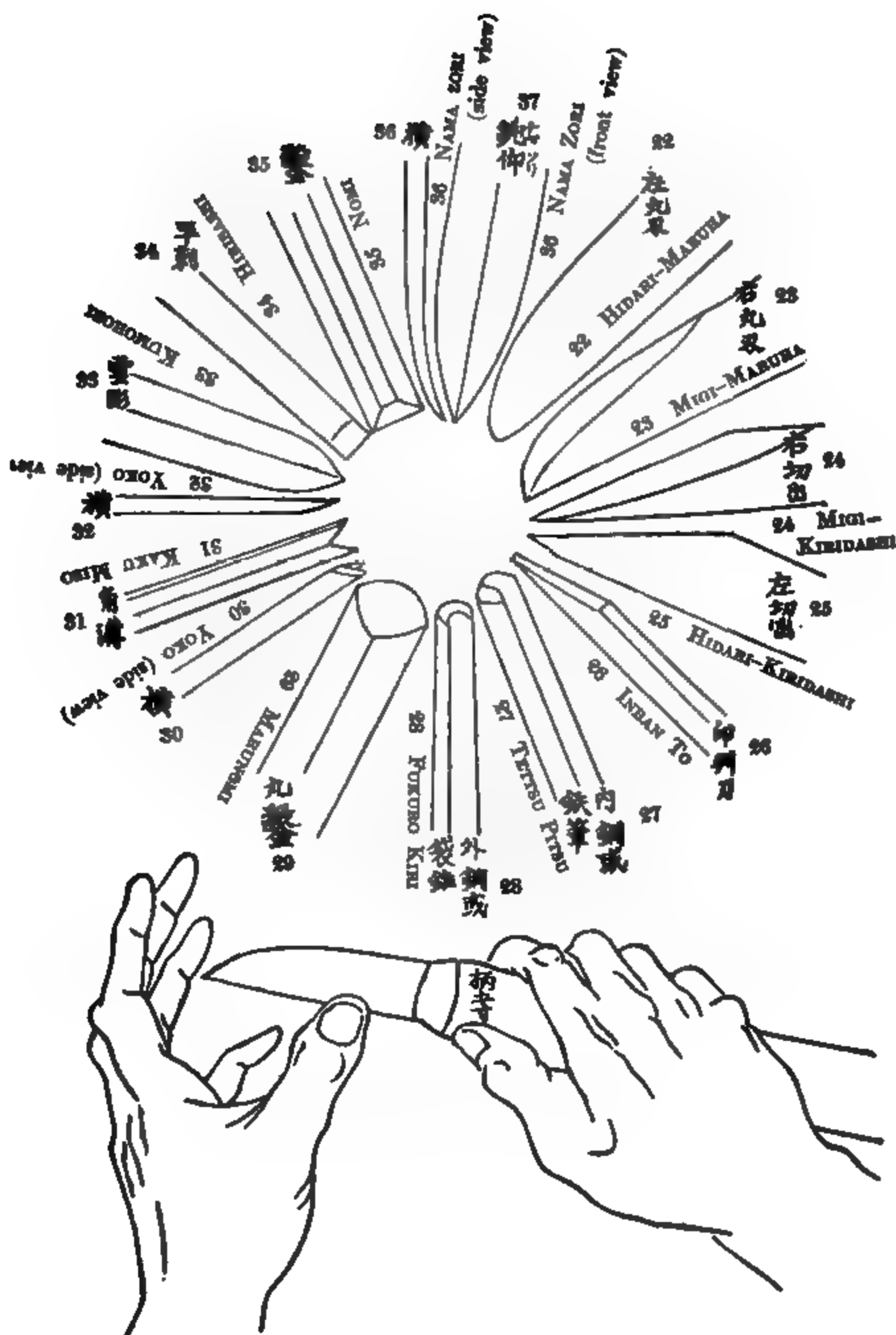
†The Japanese translations have been contributed by Mr. Yasuhisa Mogi, formerly of Tokio, Japan, the son of Mitsutoshi Otani, a noted Japanese ivory carver.



TTLEPAGE of Japanese work on Ivory Carving. The characters signify literally: Japan Soma Kuninosuke wrote "How to Carve Ivory" (Zogecho Kokuho); then v the names of six professors contributing introductions, namely: Takayuki Sasaki, Watanabe, Tsunetami Sano, Go Kawata, Riuchi Kuki, Mayori Kurokawa.



Tools used by Japanese ivory carvers, and method of handling them.
 *This tool was invented by the carver Gyoku Zan.



Tools used by Japanese ivory carvers, and methods of handling them.

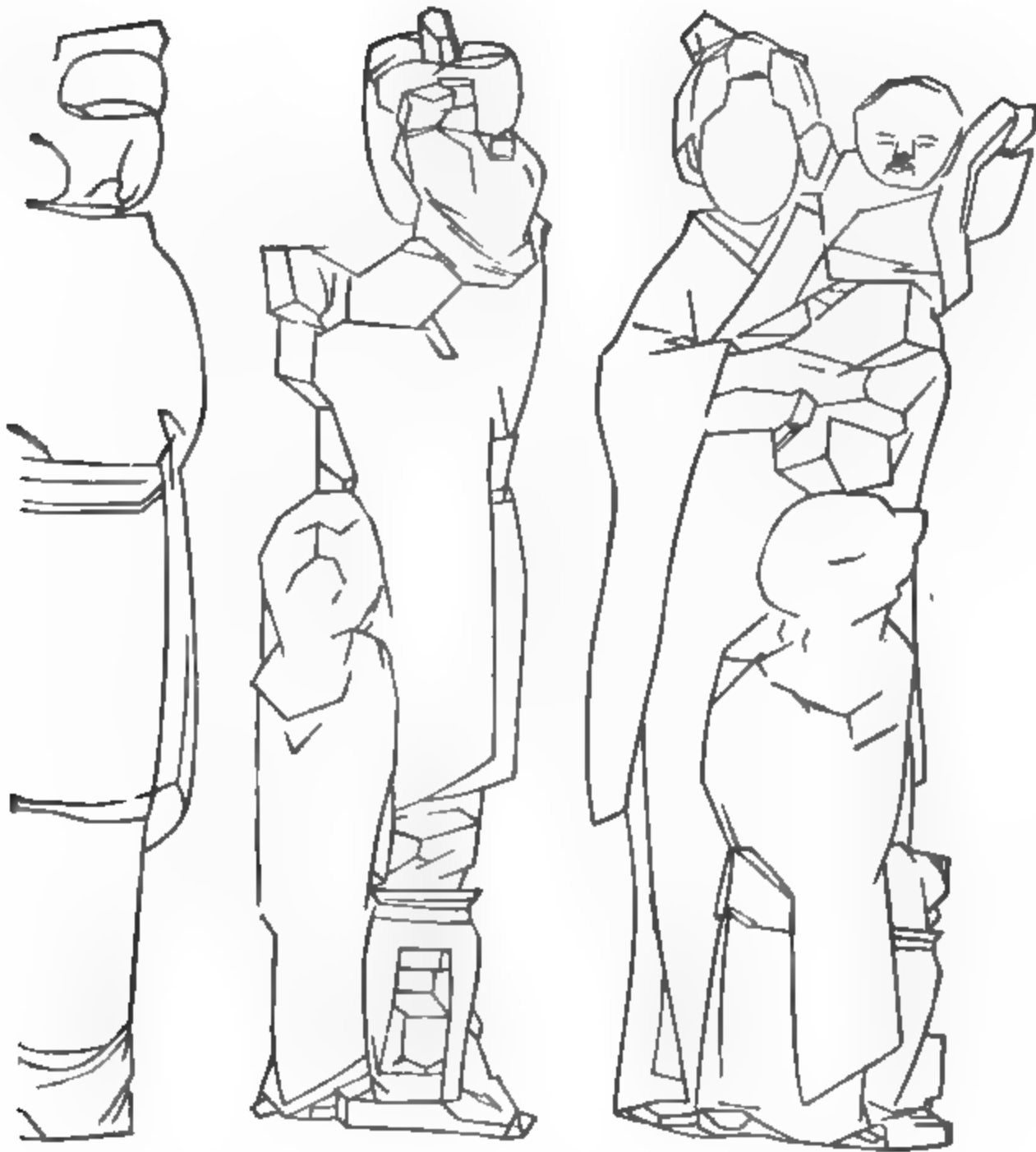
佛ルタレ附テ最勝テキ磨



AN IVORY STATUETTE by a Japanese artist.

verbally imparted teaching. There have been no books of any kind to guide us and help us in the study of these subjects. Now it often happens, when one attempts a lecture, that the very point the hearer is most interested in will be omitted or forgotten by the lecturer, and then again there are many little hints and pointers that one can-

彫ルタシ用混ヲ木葛藝



Illustrating the various stages of its carving.

not carry in the mind. Hence there can be no doubt as to the value of a carefully composed text-book which the artist can keep at his elbow, and which can be relied upon from beginning to end. Quite recently Mr. Soma Sen-rei has written such a book, entitled 'The Methods of Ivory Carving,' as a guide to beginners in the art.

“The latest and most appreciated of all the fine arts is carving in ivory; what I mean to say is that ivory carving was never so much admired as now, never placed on so high a pedestal. And yet we have just achieved our first text-book for that art. I hope there will soon be forthcoming text-books for all branches of carving in wood, stone, and metal, and also for painting, embroideries, etc.; they are so much needed.

“There is no doubt, at any rate, that this new book of Mr. Sen-rei is a brilliant achievement. Students will understand what I mean, a treasure house of valuable information for those who have any wish to utilize it. The author stands absolutely at the head of his class.

“To conclude, one word more to students of this art: if you want your knife to move freely and have mastered the necessary technique and acquired dexterity in the use of hands and arms, you ought to seek what I will try to define as a silent and meditative understanding of self—the self-knowledge that no book can give you. The student of art should seek for methods and rules in the visible forms about him, and acquire the spirit from the influence of the invisible (the pen name signed by the writer, Sessin gio-so, signifies ‘Old Fisherman of the Snowy Marsh’).”

The second introduction, by Baron Kuki Riûchi, of the Imperial Privy Council, at one time minister to the United States, and now president of the Imperial Museum of Tokio, contributes a stanza by the philosophical poet, Daigaku Zenshi:

“Oh, thou cherry-tree of Mount Yoshimo!
 Thou bloomest beautifully year after year.
 Would I or any one break thy trunk and look in,
 To see if there were any flowers within?”

This is followed by the third introduction from the pen of Dr. Watanabe Koki, a former president of the Imperial



六、猫兒失母 牛房本池玉截
 上云高四寸六分 底中一寸八分 上巾一寸四分
 明治十九年八月廿九日作

OUTLINE OF A STATUETTE traced on a section of an elephant tusk, and the completed work.

University of Tokio and president of the Tokio Society of Carving. He writes:

“Every art is subject to fixed rules and norms, and after passing through its primitive stages, these rules and regulations are gradually developed and defined as a result of the progress due to centuries and centuries of studious labour.

Besides rules and regulations, every artist adds his own ideas to these, and with skill and individuality peculiarly his own, helps on a progress which reveals to us a great field for artistic exploitation, considering the masterpieces that have lately been evolved.

"Our works in ivory carving show wonderful delicacy and artistic finish and the vital spark, so to speak, of talent and accomplishment, and are greatly admired not only at home but abroad.

"But the education in the art consists of the teacher's verbal instructions, directions, etc., and the pupil's willing hands; there never has been nor can be any mere text-books.

"It is a record of the secrets learned by his own individual experience that Mr. Sōma Kuninosūkē, member of the Tokio Society of Carving, has recorded in the book which he has named 'The Methods of Ivory Carving.' He is ambitious to raise the standard of ivory carving and add somewhat to the nation's fame and glory. With these few words I recommend this book to the public, for I am very much pleased to say that it will give great benefit to future students."

The fourth introduction is furnished by Doctor Kawata, one of the foremost students of the Chinese classics and Lecturer-in-Ordinary to His Majesty the Mikado. He gives some interesting information as to the use of ivory in ancient China. Of this and other matters regarding ivory carving, he says:

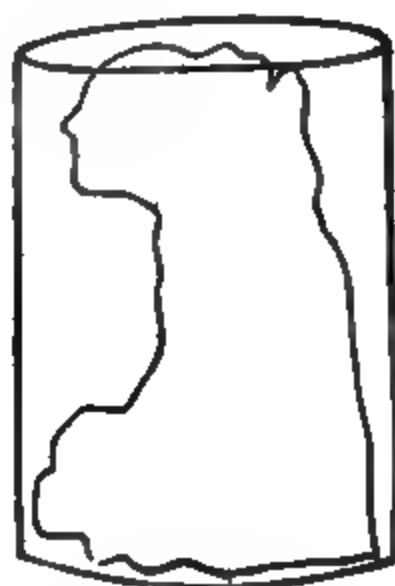
"Looking through the ancient Chinese books we find mention of quite a number of vessels and ornaments cut from ivory; for instance, ivory chopsticks are noted in the great history called 'Shiki,' dynastic and biographical records reaching back as far as the beginning of the Han [B. C. 206, A. D. 220] dynasty.

"When you examine our old records you will find that all

sorts of implements, ornaments, etc., made of ivory were used in the Buddhist temples and in the royal court; viz., white



大正十三年三月三日
 大正十三年三月三日



Netsuzukis designed in accordance with the shape of the ivory material

ivory rulers, green ivory inlaid rulers, listed in 'The offering record of the Todaiji Temple.' An ivory flat staff for

the fifth official rank and above is noted in the '*Tai-ho* court dress etiquette.' That third rank upper nobles may wear belts ornamented with ivory work and that ladies in waiting may use ivory combs is stated in '*yengi danjo shiki*' (court ceremonial regulation issued in the *yengi* period). When you examine the ivory combs, ivory flutes, and ivory brush caps in 'The Shōzōin Imperial Museum, and the ivory rulers and ivory needlecases in the famous and ancient 'Horiūji Temple' you will see that a thousand years ago there lived an artist who could cut ivory in a manner truly marvellous.

"In modern times we have many great carvers like Issai, Hōshin, Shōjiki, Insai, Shūzan, and Tanzan. These artists have dexterously carved figures, animals, birds, insects, fishes, flowers, etc. If you could read a book entitled '*Zō-taiki*,' literally meaning 'Records of Ivory Work,' written by the famous poet Sanyō, you could satisfy yourself about these artists' skill.

"Mr. Soma Sen-rei from Mutsu province, who is skilled in the art of carving ivory, has recently given us a book in which he describes the sketching and colouring of ivory, as well as all the different kinds of tools he uses, and how he uses them, all this being illustrated by himself.

"I think modern artists are extremely clever with the knife, but not with the pen; but Mr. Soma can handle the pen as well as the knife, and he makes his readers comprehend his subject thoroughly; in fact, you can instruct yourself without a teacher, so clear are the directions. I have persuaded him to publish this work, being much pleased with his enterprise."

Finally, we have an introduction provided by Dr. Kurokawa Mayori, another Lecturer-in-Ordinary to the Mikado, and an authority on the Japanese classics. Of the Japanese manual of ivory carving he writes:



JAPANESE IVORY CARVERS' WORKSHOP

IN TOKIO

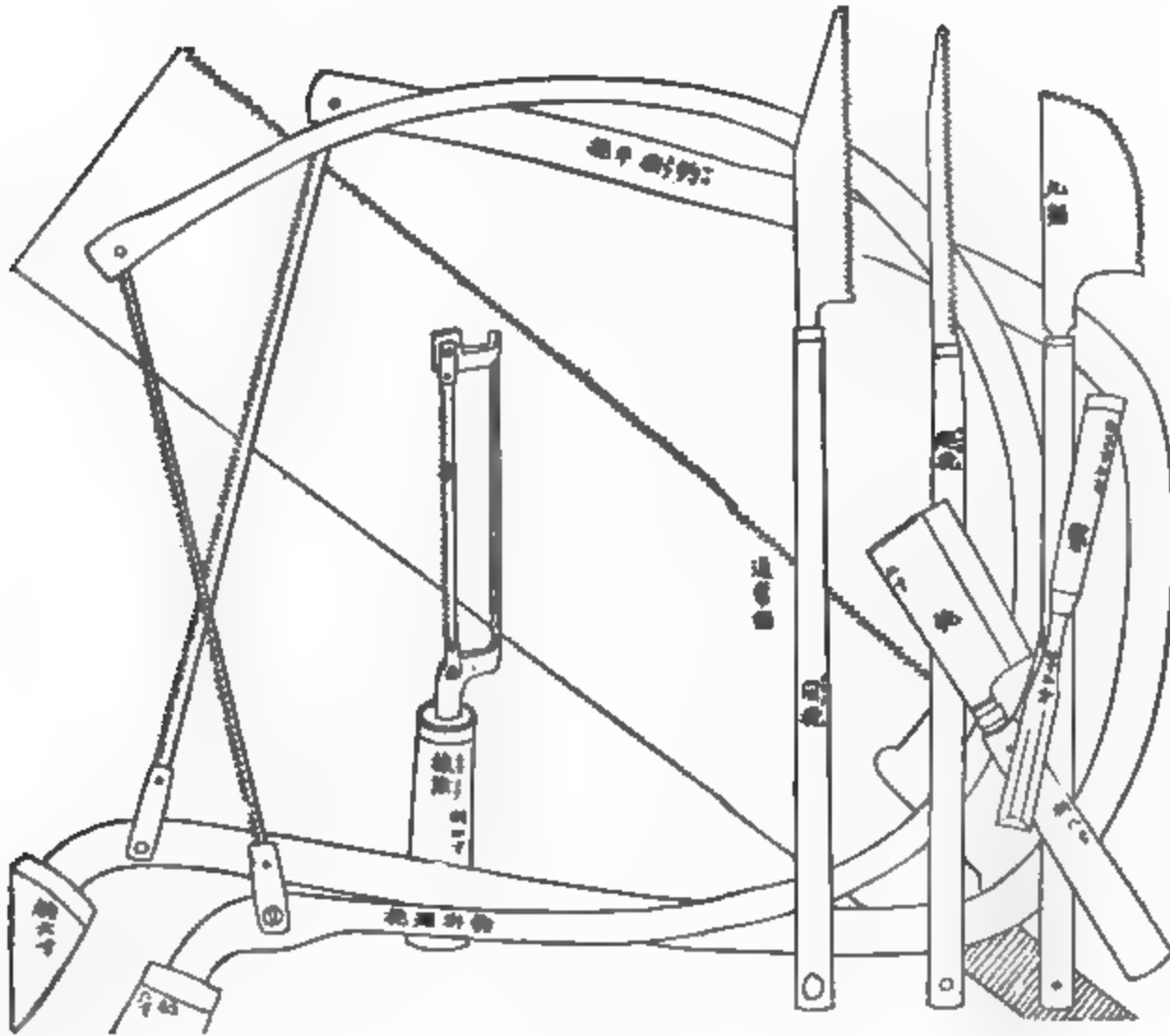
FROM THE ILLUSTRATED LONDON NEWS



I. A GROUP OF LAND SNAILS, BY RYO KUSAN
DESIGNED FOR USE AS A CRYSTAL-BALL STAND

II. A BANANA
REALISTIC JAPANESE IVORY CARVING, EARLY XX CENTURY

"It is a well-known fact that our ancestors from time immemorial have loved to engrave and limn on such material as stone, impressions received from glances at the rolling clouds or the rivulet and stream swiftly flowing onward. From the time of the building of the Asakura palace (about



FIVE SAWS used by Japanese ivory carvers

1,200 years ago), the art of carving has shown a decided and steady improvement, generation after generation. To-day it has developed to a wonderful degree; in ivory work in particular, probably no other country excels ours.

"Mr. Soma, all his life a devoted student of this art, has compiled a book entitled 'The Methods of Ivory Carvings' which he has brought to me, with the request that I write

an introduction for it. After very careful examination of the work I found his way of describing things to be very sincere and useful, especially his rules and methods regarding human figures, animals, birds, fishes, and almost all living things; these rules being imparted in such a way as to bring the students to an easy understanding of the matter.

“Therefore, I predict that his efforts will greatly assist the progress of students, and that many will thus achieve fame who otherwise would have found the art much too difficult for them.”

English ivory workers are admitted by the Worshipful Company of Turners, an organization founded in London, to the annual competitions instituted by this society, under Class III, comprising amateurs. The chief prize here is the Company's Silver Medal, in addition to which special certificates of merit may be accorded for some of the best work displayed. The extent to which some apparatus has been used to supplement or modify the hand work is taken into consideration as well as beauty and originality of design and appropriateness. The last competition held in April, 1914, was the thirty-sixth of those held under the auspices of this society.

CHAPTER VIII

VEGETABLE AND IMITATION IVORY

THE beauties of genuine ivory are such, and they are now so highly and generally appreciated, that even articles made of imitation ivory are sold in great quantities. This is known under various trade names, as "Parisian ivory," "French ivory," "Egyptian ivory," and "ivorloid." A favourite modern use is for clocks, some of which are provided with an electric flashlight, the apparatus being so disposed in a funnel slanting toward the clock face that when a button is pressed the dial is brightly illuminated, enabling any one to see immediately the time when in an entirely dark room.

The tagua palm, as the natives of Ecuador call the *Phytelephas macrocarpa*, was first brought to popular notice about fifty years ago by some rubber gatherers, who, in carrying on their work in the forests of northern Ecuador, had come across an unfamiliar species of palm, having as fruit a nut in whose shape they saw a grotesque resemblance to a negro's head, and hence called the nuts *negritos*. Having picked up, dried out, and broken open some of them, they noted that the kernels bore a close resemblance to ivory, and the idea quickly suggested itself that they might be used as a cheap substitute for the costly, genuine material. To test the value of the nuts some were shipped to Europe; and although at first they were not received with much favour, their excellent qualities soon became ap-

parent, more especially for use in the manufacture of buttons and similar small objects for which ivory had been used. In this way a valuable article of commerce was introduced, and the trade has increased so rapidly that 20,000 tons of the nuts are now exported annually from Ecuador alone, the value of this product amounting to \$1,700,000. In addition to this both Panama and Colombia send a continually increasing supply to Europe and the United States. This palm flourishes in southern Panama and in the region of the west coast of Colombia, Ecuador, and northern Peru. The tree is said to begin bearing in its sixth year and to live from fifty to one hundred years.*

The work of gathering the nuts is largely in the hands of the natives, who secure from the merchants or exporters, on credit, a simple outfit, consisting of a machete, an ax, a gun, some ammunition, and also supplies of rice, lard, and beans or lentils. The price of this is paid at the end of the season in ivory nuts or rubber. The parties of natives paddle up the rivers to the forest lands, to reach the largest of which a trip of from three to six days is needed. Arrived at their destination, each party encamps on the banks of a stream, building a rough shelter with a palm-leaf roof. The nuts, as they are gathered, are deposited in woven baskets two feet high and a foot in diameter, and are transported to the encampment either on mule back or on the shoulders of the native gatherers. When some 15 or 20 tons of nuts have been accumulated, the filled baskets are placed on rafts made on the spot from sections of peeled trunks of the cork tree called *balsa*, and floated down to the point of delivery. The merchant pays for them at the rate of 2

*The details embraced in this and the following paragraphs are taken from the valuable paper of Mr. Edward Abbes of the Pan-American staff, published in the Bulletin of the Pan-American Union for August, 1913, pp. 192-208, and entitled "Tagua Vegetable Ivory."

or 3 sucres (the sucre equals 48.7 cents of our money) per hundredweight. This would bring in on an average about \$240 for a ten-ton raft load. About half of this sum has to be deducted for outfit and provisions, leaving \$120 or something less as the season's profit for the two or more natives constituting a party.

From the storehouses of the merchants the nuts, sewed up in sacks, are taken to the seaport warehouses at Esmeraldas or elsewhere. An export duty, sometimes in Ecuador as high as \$1 on unshelled nuts and \$1.40 on shelled nuts, trader's profit, cost of handling, brokers' commissions, etc., bring up the price for the United States manufacturers to about 6 cents per pound, making \$120 a ton; as we have seen, the native gatherer gets only \$24 a ton, but half of this being profit.

The great use to which this product is put in the United States is for button manufacturing. The ivory nuts usually come to the factory in their original state with the hard encasing rind. So hard is this, indeed, that when the nuts are dried a steel fork will not cut them, but—like the diamond in this—a smart blow of the hammer will fracture them. After having been broken, they are spread out for further drying in a temperature of 100°; by this means the inner part of the nut becomes loosened from the shell. This inner part is then sliced up by circular saws making 600 revolutions in a minute, a solid piece being taken from each side, the usually defective core being rejected.

The solid pieces are then still more thoroughly dried out in a drying room until absolutely no moisture remains; this causes their hue to change from a bluish white to an ivory white or cream colour. Their hardness equals that of bone, and while subsequent soaking during the stages of manufacture swells them temporarily, they return to their former hardness. The dimensions of the pieces secured in

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this way range from $\frac{1}{4}$ to $1\frac{1}{4}$ in. in diameter, or from 10 lines to 50 lines according to the unit of measurement employed in button manufacture.

The separate pieces are sorted according to size by being fed into a revolving cylinder with perforations of different diameters, which deposits them automatically in separate bags. The product is then rapidly sorted by hand, all defective material being rejected. Those fitted for use are now immersed in hot water so as to soften them, and set vertically in a lathe, where two rapidly revolving tools, cutting simultaneously on the right and left, give the piece the proper shape; the ring is then cut off and the shaped piece falls into a case or compartment. Dust and shavings have a value for polishing purposes, the rings being sold as waste or utilized for fuel.

Drilling requires more complex machinery, the holes being drilled and reamed out at the same time; some of these machines are automatic, others are worked by hand. Each button is turned by the machine to the proper angle for the drilling and reaming of the two or four holes to be made. The number of buttons turned out in a single day by one of the automatic machines reaches 200 gross, about half as many representing the daily product of a hand machine.

As to their colouring, buttons fall into two classes, those having solid colours and those of mottled colour. Those of the former class are simply dyed, but for mottling are used sheets of metal incised with stencils of the requisite design. A number of rows of buttons—usually ten—are placed on boards measuring a foot in length and breadth, and the stencilled sheet having been laid over them, accurately covering each button, the dye is blown over the stencil by a mechanical atomizer; only the exposed portion of the button is touched by the dyeing material. As a variety,

shellac may be blown over the stencil on the button, leaving the design white when the button is plunged in the dye. All these colours are, however, only brought out in the finished state by chemical treatments.

There remains the task of imparting a proper finish to the surface of the button. This may be either dulled, polished, or pressed. Some of the choicest kinds offer a combination of several types of finish, as a polished rim with a centre of dull finish, which is called the "sandblast finish." Plain polished buttons of the finest quality receive what is known as hand finish, each piece being separately handled while polished on a buffing machine.

The great development of the trade in tagua nuts is shown by an annual importation into the United States valued at \$1,500,000. There are now in the land as many as 23 factories using this material, the capital involved amounting to \$4,000,000. Rochester and Brooklyn in New York, Newark in New Jersey, and Springfield in Massachusetts are the chief centres of this manufacture, Rochester being said to have the three best plants in the world, and to make the highest grade material.

The Colombian port of Esmeraldas owes its present prosperity, growth, and importance to the thriving trade in vegetable ivory, of which the annual exports now amount to 6,000,000 kilograms (13,200,000 pounds), and which yields to the Colombian Government an annual revenue of \$487,000, the amount of the export duty collected on the tagua nuts.*

The provision in the tariff of 1897, imposing both a specific and an *ad valorem* duty on buttons manufactured out of vegetable ivory, led to a notable increase in the quantity of this material imported into the United States. Prior to

*Bulletin of the Pan-American Union, June, 1914, p. 937.

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this time the bulk of the vegetable ivory of Panama, Colombia, and Ecuador had gone to Hamburg to be worked up into buttons by German manufacturers, but the new duty on such buttons served to divert the supply of the raw material to our ports, as the American button manufacturers were now able to compete successfully with their German rivals. Ecuador is said to furnish the best quality of nuts of the *Phytelephas macrocarpa*, the “vegetable ivory” of commerce.*

The specific gravity of vegetable ivory from the tagua nut, popularly called *Cabeza de Negro* (Negro’s head), taken at 10° centigrade, has been given as 1.376, and its constituents are stated to be as follows:†

Gum	6.73
Legumin, or vegetable casein	3.80
Vegetable albumen	0.73
Ash	0.61
Water	9.37
Lignin	81.34
	<hr/>
	102.58

The imports into the United States of vegetable ivory nuts for button manufacture are constantly increasing. The chief sources of supply are, as we have noted, Colombia and Ecuador, the last-named country producing 17,000,000 pounds of the 29,000,000 imported in 1913; in 1912 the total import was 23,000,000 pounds; while in 1908 it amounted to but 14,500,000 pounds, showing an increase of 100 per cent. from 1908 to 1913. The following are the principal producing ports of Ecuador for unshelled nuts: Esmeraldas, Manglarato, Bahia, Manta, Cayo, Puerto Bolivar, Macara,

**Scientific American*, Supplement for December 28, 1912, p. 409.

†Arthur Cornell in *Phil. Mag.*, February, 1844, p. 104, as cited in *Dingler’s Polytechnisches Journal*, Vol. 92, p. 79, 1844.

Machalilla, and Guayaquil; shelled nuts come from Manta, Guayaquil, Cayo, Machalilla, Manta, Esmeraldas, Macara, and Puerto Bolivar. The best quality of tagua is secured in Puerto Bolivar and Macara, and is shipped from Guayaquil. The best and soundest nuts are those picked from the trees; those which have fallen off and are collected from the ground are frequently wormy. The weight of unshelled tagua received in Bahia in 1913 was 8,000,000 pounds, but the shelled product finally exported weighed only 4,755,100 pounds, showing a loss in weight for shells and defective nuts of 3,244,900. The worm-eaten nuts are usually weeded out at the haciendas before the product is sent to Guayaquil, as exporters refuse to buy them, not merely because of their defective condition, but also on account of the risk that they will infect the sound nuts if packed up with them. At present the first quality of tagua is sold in warehouses in Ecuador for 7 sucres (\$3.41) for 100 pounds, ordinary commercial nuts bringing 6 sucres (\$2.92) for 100 pounds; rejected nuts could be had as low as 1 sucre (48.7 cents) for 100 pounds. In each case the cost is increased by \$1.70 for export duty and shipping expenses. One shelling machine is at work in the Province of Manavi, and there are several others in operation in various parts of Ecuador. An important recent foundation is the Ecuadorian Industrial Company of New York, said to owe its organization to a former United States minister to Ecuador. This company will install a plant in Manta for shelling the nuts and giving the kernels the first rough shaping for button manufacture, thus saving the freight charge on superfluous material.*

The extensive use of vegetable ivory is shown by the large imports of this material into the United States from

*Consul-General Frederick W. Goding of Guayaquil, "Vegetable Ivory Exports from Ecuador," *Daily Consular and Trade Reports*.

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1884 to 1911 inclusive, which are given here from official figures:

YEAR	WEIGHT IN POUNDS	VALUE
1884	7,761,906	\$ 229,630
1885	8,301,421	194,046
1886	8,064,989	157,362
1887	5,776,515	144,663
1888	7,051,664	156,533
1889	5,776,430	96,605
1890	5,039,473	61,477
1891	7,178,144	76,837
1892	8,552,976	114,753
1893	15,195,565	275,282
1894	7,220,799	101,397
1895	8,050,128	889,437
1896	8,052,275	80,642
1897	4,445,100	44,618
1898	15,211,709	157,275
1899	8,815,075	88,479
1900	16,036,389	243,548
1901	13,533,821	179,735
1902	14,679,215	165,489
1903	17,195,948	196,246
1904	15,740,702	229,944
1905	19,678,913	410,883
1906	22,068,290	516,435
1907	16,619,075	467,100
1908	14,536,470	376,021
1909	20,001,094	608,684
1910	27,066,716	1,104,924
1911	20,782,911	771,970
Totals	<u>348,433,695</u>	<u>\$7,340,015</u>

For the fiscal year ending June 30, 1913, the import vegetable ivory was 28,983,791 pounds, having a value \$970,978; for the year ending June 30, 1914, the correspond-

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ing figures are 26,736,148 pounds and \$883,055. The average for these years exceeds the returns for any previous year in weight, although not equalling in value the figures for the calendar year 1910.

Weight in pounds and value in dollars of vegetable ivory imported into Great Britain, according to the countries whence consigned:

WEIGHT

	1906	1907	1908	1909	1910
Germany . . .	358,600	359,600	557,600	434,400	454,800
Colombia . . .	292,600	281,800	276,000	18,000	143,300
Ecuador . . .	1,045,600	1,395,100	1,816,900	1,042,300	1,429,200
Other for'n countries	341,300	224,900	226,800	370,900	223,700
<hr/>					
Total from foreign countries . . .	2,038,100	2,261,400	2,877,300	1,865,600	2,251,000
Total from British possessions	235,900	60,000	400	1,200	80,900
<hr/>					
Grand total	2,274,000	2,321,400	2,877,700	1,866,800	2,331,900

VALUE

	1906	1907	1908	1909	1910
Germany	\$15,181	\$22,247	\$26,811	\$25,361	\$27,029
Colombia	10,316	7,901	10,045	655	9,598
Ecuador	41,497	61,983	75,733	65,917	99,377
Other foreign countries	15,350	10,282	9,108	19,032	14,041
<hr/>					
Total from foreign countries . . .	\$82,344	\$102,413	\$121,697	\$110,965	\$150,045
Total from British possessions . . .	4,996	2,328	10	90	4,651
<hr/>					
Grand total . . .	\$87,340	\$104,741	\$121,707	\$111,055	\$154,696

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 Total imports of vegetable ivory into Great Britain from
1896 to 1910 inclusive:

YEAR	WEIGHT IN POUNDS	VALUE IN DOLLARS
1896	3,012,900	
1897	1,641,200	
1898	1,271,600	
1899	1,718,800	
1900	1,397,200	
1901	1,621,100	
1902	709,600	
1903	1,952,500	
1904	2,346,700	
1905	970,600	
1906	2,274,000	\$87,340
1907	2,321,400	104,741
1908	2,877,700	121,707
1909	1,866,800	111,055
1910	2,331,900	154,696

 The growing activity of the German button-making industry has led to the importation on a large scale of the ivory nut into Germany, the following figures being officially given:

1911	. . . . .	14,349 tons
1912	. . . . .	16,579 “
1913	. . . . .	20,299 “

 Prices have, of course, varied according to the supply of the material and the prosperity of the industry. The highest figures were reached in the latter part of 1912 and the early part of 1913, a reaction due to increased supply and changes of fashion having set in the latter part of 1913. For purposes of comparison we give here the quotations for the various grades of material in December, 1912, and

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December, 1913, the prices all referring to 50-kilo lots, equivalent to 110.23 pounds:*

GRADE OF IVORY NUTS

Unshelled:	1912	1913
Guayaquils	\$4.76-5.24	\$3.81-4.76
Esmeraldas	5.95-6.19	4.64-5.47
Tumacos	6.19-6.90	4.52-5.00
Sabinallas	4.28-5.95	3.57-5.24
Cartagenas	5.24-5.71	3.33-3.81
Shelled:		
Guayaquils	6.66-6.90	6.19-6.66
Cartagenas	9.04-9.28	5.00-5.36

A process of making a substitute for ivory from rubber was invented many years ago, by Frank Marquand, of New York, N. J. Two pounds of pure rubber were to be treated with thirty-two pounds of chloroform; as soon as the rubber had dissolved it was to be saturated with ammonia. When it had thus been thoroughly bleached, the material was to be placed in a vessel, hot water being added, and the material stirred about until the bleaching agents had been entirely removed. The temperature might be raised to 85° C., so as to evaporate the chloroform. The remaining material to which the rubber had been reduced was to be compressed and dried; and then again treated with a little chloroform until it became a thick paste. This was then to be mixed with a powder of zinc phosphate or hydroxyapatite, causing it to become mealy, when it was to be pressed in molds, which were to be heated so as to remove the superfluous chloroform. As soon as the mass was taken out of the molds it could be worked in the lathe, and closely resembled ivory. By the addition of certain colouring

Consul-General Robert P. Skinner of Berlin, "German Trade in Button-making Materials," *Daily Consular and Trade Reports*, p. 794; supplementing report published May 6, 1914.

matter, a pearly or coralline appearance could be imparted to this artificial product.*

As a substitute for ivory a composition containing milk as one of the ingredients has been experimented with, the name bestowed upon it, "Galalith," suggesting the half-mythical galactite, or "milk-stone," of olden time. The great world war operating to cut off much of the usual supply of ivory and the fear that, even under normal conditions, the wholesale slaughter of elephants would sooner or later render genuine ivory a very scarce article, has served to draw attention toward any possibly satisfactory substitute, and the new milk-containing composition has been favourably received in some quarters.

An effective method of distinguishing genuine ivory from its vegetable substitute has been recommended. This is to treat a sample piece of the material to be tested for from twelve to fifteen minutes with concentrated sulphuric acid. The whiteness of genuine ivory remains unaffected by this treatment, while the vegetable ivory, derived from the *Phytelephus macrocarpa*, becomes rose-tinted. It can, however, readily be restored to its original hue if washed with water.†

The substance named celluloid, composed of cellulose or vegetable fibre reduced by acids to gun cotton, camphor being then added, is the most commonly used substitute for ivory. After the addition of the camphor and any required colouring matter, the resultant mixture is condensed in cylinders, and finally moulded by heat and pressure into the various desired forms, whether useful or ornamental. Lacking as it does all the finish and delicacy of ivory, even in its external appearance, the camphory odour pervading celluloid and its inflammability make it

**Chemical News*, October, 1866, p. 19.

†*Scientific American*, Supplement No. 1235, p. 19800; September 2, 1899.

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in many ways a very poor substitute. Nevertheless, where merely a general superficial effect is desired, there is a demand for it on account of its cheapness.

A marked increase in the imports of celluloid is indicated by the customs returns for the fiscal years 1913 and 1914, as given below:

	1913		1914	
	POUNDS	VALUE	POUNDS	VALUE
In blocks, sheets, rods, tubes, or other forms, not polished, and not made up into fin- ished or partly finished ar- ticles	22,305	\$18,838	.....	\$59,270
Polished wholly or in part, or in finished or partly finished articles.	125,006	267,502	.....	521,175

Thus the imports of polished and finished collodion were nearly twice as much in the fiscal year 1914 as in that of 1913, and the unpolished material showed an increase of more than 200 per cent. Owing to the application for a great part of 1913-1914 of an *ad valorem* instead of a specific duty under the provisions of the new tariff, the total weight for 1913-1914 is not ascertainable.

CHAPTER IX

NARWHAL HORNS, WALRUS TUSKS, ETC.

THE horn of the narwhal was regarded as an object of great value in Viking times, partly on account of the difficulty and danger experienced in obtaining it, and partly for its beautiful texture when carved. The Vikings decorated the prows of their war galleys with these horns, had them carved into sword and dagger-hilts, and also set them on staffs and sceptres. Their wives wore hair-pins made out of this material, and curiously wrought charms, which were considered talismans of good luck both in love and war.

The ancient Chinese, apart from a superstitious belief in the potency of these "horns" against the machinations of evil spirits, placed a high value upon them as medicinal agents. For this use they were reduced to a powder and administered to the patient in water or some other liquid. The Chinese also carved them into amulets or charms of the God of Good Luck, believing that the wearer of such a charm would not only be protected from danger, but would be fortunate in all his undertakings and would enjoy good health and long life. Unfortunately for those who wish to have a share of this good fortune, the narwhal is now almost extinct, and is only rarely found in the Arctic Seas.

The coronation chair of the kings of Denmark, preserved in the great banqueting hall or Riddersaal, of Rosenborg Castle, is formed to a great extent of the tusk of the narwhal. It was doubtless believed that the presence of this material,



**THE DANISH CORONATION CHAIR
IN ROSENBORG CASTLE,
COPENHAGEN, DENMARK**

THE HEIGHT OF THIS EXTRAORDINARY EXAMPLE OF WORK IN NATURAL TUSKS IS ABOUT 8 FT. 4 IN., AND ITS WIDTH ACROSS THE ARMS ABOUT 3 FT. 2 IN. IT WAS MADE BY DIRECTION OF KING FREDERICK III (1609-1670), BUT WAS FIRST USED AT THE CORONATION OF HIS SON AND SUCCESSOR, CHRISTIAN V, IN 1671. THE SILVER FIGURES, PERSONIFICATIONS OF THE VIRTUES, ARE LATER ADDITIONS
SEE ADDENDA, PAGE 481



GOD GIVING ADAM DOMINION OVER ALL CREATION

FROM A FLEMISH TAPESTRY

GALLERIE ANTICA E MODERNA

to which great talismanic virtues were ascribed, would help to assure for the new king a happy and glorious reign. Though now of comparatively little value, these narwhal's tusks were, a few centuries ago, very costly, and only the rich could afford to buy them.*

The treasury of the Abbey of St. Denis near Paris guarded as one of its chief ornaments a "unicorn's horn," measuring 6 ft. 7 in. in length and weighing 25 marcs 3 ounces, or about 13 pounds. A valuation of 6,090 crowns (\$13,500) was put upon this by those who made the inventory of 1534.† The weight indicates that this was a narwhal's tusk and not the elephant's tusk said to have been bestowed upon Charlemagne by Haroun al Rashid at the time the latter sent an embassy bearing a number of valuable gifts to Charlemagne, among which was a live elephant.‡

Among Anne de Bretagne's treasures was a unicorn's horn having a silver-gilt setting at either end. It measured 6 ft. in length and weighed $21\frac{1}{2}$ marcs, or about $11\frac{3}{4}$ pounds avoirdupois; hence this was evidently one of the narwhal tusks so greatly prized in the olden time. To preserve it from possible injury the "horn" was enclosed in a leather case provided with lock and key, and this case in turn was securely locked up in a wooden coffer.**

We have a detailed description of a very fine "unicorn's horn" preserved in the treasury of Strassburg Cathedral in the sixteenth century. This description was given to the celebrated naturalist Conrad Gesner by his friend Nicholas

*Murray, "A Handbook for Travellers;" Denmark, 4th ed., London, 1875, p. 58.

†Bibl. Nat. MS. fr. 18766; Fol. 27 of transcript in writer's library.

‡Lydekker thinks this was an elephant tusk; but the light weight is against this view. He is mistaken in stating that Eginhard relates the gift of an elephant's tusk to Charlemagne by Haroun al Rashid; it was a live elephant that was sent. However, as this animal died a few years later, we may suppose that the tusks were preserved somewhere. R. Lydekker, "Mammoth Ivory," Report of Smithsonian Institution, 1899, p. 364.

**Inventaire d'Anne de Bretagne, 1498, Bibl. Nat. MS. français 22335. Fol. 53. Transcript in author's library from collection of M. É. Molinier.

Gerbel. The "horn" when placed upright would have attained the height of a tall man, had the point not been broken off. This act of vandalism was chargeable to one of the custodians, who had learned that this part was especially valuable as an antidote for poisons and as a remedial agent against the plague. When the mutilation was discovered the custodian was of course discharged, and it was expressly decreed that no one of his family should ever be entrusted with a share in the custody of the cathedral treasures. Otherwise, this "horn" was in perfect condition and displayed the spiral lines characteristic of the narwhal tusk; similar to those in "St. Blaise's Candles," says Gerbel. Of the weight he simply remarks that it was "greater than one would dare believe"—a rather vague statement; its circumference is indicated by the declaration that he could just span it with his right hand. The colour was that of old ivory, a yellowish white. To whom the cathedral was indebted for this gift the informant could not tell.*

Gesner also mentions two of these "horns" of the type used at royal banquets to test the viands for the presence of poison. According to his version they were laid upon the table and were believed to reveal the poison by immediately becoming covered with abundant moisture. He notes two of these horns, each measuring two cubits in length, and having a circumference equal to that of an arm. One of them was given to Sultan Solymán the Magnificent by the Venetian Senate, and the other was presented to the King of France by Pope Clement VII, this latter had the point taken off and was inserted in a silver base. Gesner neither ventures to affirm nor deny the miraculous qualities of the horns, merely giving the popular belief as it was commonly accepted.† He adds that when the French spoiled Vercellæ, in

*Conradi Gesneri, "*Historia animalium*," Francoforti, 1602, Lib. I, de quadruped. viviparis, p. 693. †Ibid.

1553, they were said to have carried off a unicorn's horn valued at 80,000 ducats as a gift to their sovereign, Henri II. In all, this writer knew of about a score of these rarities in Europe.

In the sixteenth century four of these narwhal tusks were preserved in Plessenburg, in Bavaria, as great rarities. One of these had been accepted by a Markgrave of Bavaria as a settlement of a heavy debt due from Charles VI of Germany, and for the largest specimen the Venetians had vainly offered, in 1559, the immense sum of 30,000 sequins. Another was used as a remedial agent, but only for members of the reigning family; a small section being cut off to serve as an amulet. A narwhal's tusk in the collection of the Elector of Saxony, at Dresden, was valued at 100,000 thalers.*

The extraordinary virtues supposed to be possessed by "unicorn's horns" as detectors of poisons rendered them of exceptional value in the fifteenth and sixteenth centuries, when poisoning was so often resorted to as a means of ridding the world of inconvenient rivals. Charles VI of France owned a piece 3 ft. long in 1399, and in 1420 among the treasures of the Dukes of Burgundy was a horn 7½ ft. in length, and as we have seen, in 1498, Anne de Bretagne had one 6 ft. long. A unicorn's horn stolen from the house of Pietro de' Medici in Florence, in the beginning of the sixteenth century, was valued at from 6,000 to 7,000 ducats. As it was so inimical to poison, a drinking-vessel made of this material was of course considered a great treasure. A specimen is noted in the Londesborough Collection, and bears inscribed beneath it the name of the Hungarian hero-king Hunyadi Janos, and the date 1444.†

*Havorka and Kronfeld, "Vergleichende Volksmedizin," Stuttgart, 1908, Vol. I, p. 323.

†*Miscellanea graphica*: representations of ancient, medieval, and Renaissance remains in the possession of Lord Londesborough, introd. by Thomas Wright, London, 1857, pp. 26, 27 (woodcut of goblet on p. 27). On Pl. IV is figured (½ nat. size) an ivory "Main de Justice" of Louis XII of France. On the third finger of the hand proper is a ring set with a small pearl.

Windsor Castle could boast, in the sixteenth century, the possession of an exceptionally fine unicorn's horn, of which more than one description has been preserved for us. That of Hentzner, the tutor of a young German nobleman who made the English tour in 1598, is brief but significant: "We were shown here at Windsor Castle among other Things the Horn of a Unicorn, of above eight Spans and an Half in Length, valued at above £10,000."* An English authority gives a fuller description, noting the special conformation of this horn, and likening it in this respect to that said to have been given by Haroun al Rashid to Charlemagne and preserved in the treasury of St. Denis. It was "seven great feet in length," and was said to weigh thirteen pounds, although when taken in the hands it seemed to be heavier. In form and appearance it suggested an immense wax candle. Of the spiral twists this writer says: "The splents of the spire are smooth and not deep, being for the most part like unto the wreathing turnings of snailes, or the revolutions or windings of woodbine . . . but they proceed from the right hande toward the left, from the beginning of the horn, even unto the very ende."†

That the virtues of these substances were often regularly tested appears from this passage in De Boot's treatise:

"I saw a horn in the possession of Philibert de Bois, a merchant of Prague, who had received it from the envoy of the Duke of Moscow at Prague as security for a loan of one thousand ducats. However, as this horn was not found to have any virtue against poison, the gem-dealers declared it was not a unicorn's horn, although it bore all the marks of being one."‡

*"A journey into England, by Paul Hentzner, in the year MDXCVIII"; trans. in Dodsley's "Fugitive Pieces," London, 1765, Vol. II, p. 293.

†Topsell, "History of foure-footed beastes," London, 1607, cited in Phipson "The Animal lore of Shakespeare's Time," London, 1883, pp. 456, 457.

‡Lapidum et gemmarum historia, Lug. Bat., 1636, p. 435.

We are told that in 1593 the physicians of Augsburg tested the virtues of one of the horns as an antidote for poisons in the case of a child, and they also experimented with kittens and pigeons. A memorial relating to these experiments was drawn up and signed by the physicians present, the results not being very conclusive. Valentinus relates this, and adds that he, himself, would hesitate to make any such experiments on a human being, trusting blindly to the powers of the horn.*

Teeth or horns that were found buried in the earth were sometimes called buried unicorn, or fossil unicorn. They appeared like the bones of men or animals, or like teeth or horns, being brittle, light, and porous, with an earthy flavour, yellowish gray or brown in colour, and of various dimensions. Frequently they were hollow within, or else filled with a soft greasy earth; they were found in the Hartz Mountains, in Silesia, in the Palatinate, and in Wurtemberg. The popular belief was that this material represented the bones of animals or giants, which in the time of the Deluge floated away and became petrified in the earth.†

The great demand for these precious "horns" appears to have been satisfied by quite an abundant supply, for a writer of the beginning of the eighteenth century, treating of this type, asks:

"If it be so rare, whence come so many hundreds of horns which are found here and there, and are in daily use? Not to speak of unicorn's horns such as appear in the Royal Treasury at St. Denis, near Paris, in Copenhagen, in the Castle church at Dresden, in the Museum there, and in other places, where they are preserved in costly cases and suspended by golden chains; almost every druggist and apothecary can

*Valentini, "Museum museorum, oder Vollständige Schau-Bühne," Franckfurt am Mayn, 1714, Bk. III, cap. 30, §4, p. 483.

†Valentini, op. cit., Bk. III, cap. 30, §5, p. 483.

show us one or more. They have now become so common that specimens which were formerly valued at many thousand thalers can now be bought for a few dozen thalers. Wherefore it is entirely false to suppose that they can come from so rare a creature, which is simply a product of the imagination and is therefore so variously described by learned and unlearned alike."

The tusk of the narwhal (*Monodon monoceros*) is only found in the male of the species. While in general there is but a single tusk, on the left side, it happens occasionally, though rarely, that there are two, one on the left and the other on the right side. Their length is sometimes more than half that of the body of the animal itself, and a peculiarity distinguishing these tusks from those of the elephant is the fact that the central cavity is prolonged up to the end, so that one can look through them as through a funnel. The sides show the wonderfully beautiful spiral structure that makes up the tusk when viewed from within or without.

The earliest known mention of the unicorn appears in the *Indika* of Ctesias of Knidos, who was for seventeen years, from 416 to 398 B. C., the court physician of the Persian monarchs, Darius II and his successor, Artaxerxes Mnemon. The Indian unicorn which he describes, or attempts to describe, is most probably the rhinoceros, although so many heterogeneous elements are grouped together that the attribution cannot well be certain. One thing, however, is interesting to note, namely, that even at this early time the horns were believed to possess powers analogous to those they were credited with in medieval times. Of this Ctesias writes:* "These horns are made into drinking-cups, and such as drink from them are attacked neither by convulsions nor by the sacred disease [epilepsy]. Nay, they are not even affected by poisons, if either before or after taking them they

*McCrindle, "Ancient India as Described by Ktesias the Knidian," London, 1882, p. 26.

drink from these cups wine, water, or anything else.” The animals themselves are described by Ctesias as “wild asses as large as horses.” The head was of a dark red colour, the eyes blue, and the rest of the body white. The single horn projected from the forehead and was about one cubit in length; it was pure white until toward the middle, where it became black, and finally tapered off to a sharp point which was of a flaming crimson. Whether this account is purely fantastic or may have been based upon the observation of some artificially coloured horns is not easy to determine. It has been conjectured by some that Ctesias was influenced in his account of the unicorn by the appearance of certain Persian sculptures where an ibex is shown with apparently a single horn, although this merely signifies that the artist figured the animal in profile, where one horn was directly behind the other, and hence not visible.

However, the details given by this writer as to the method of hunting the unicorns and the definite character of his statements, in spite of certain obvious errors and exaggerations, make it more probable that the animal in question was really the rhinoceros. Of the hunting he says: “These animals can only be caught . . . when they lead their little foals to the pastures in which they roam. They are then hounded in on all sides by a vast number of hunters mounted on horseback, and being unwilling to escape while leaving their young to perish, stand their ground and fight, and by butting with their horns and knocking and biting, kill many horses and men. But they are in the end taken pierced to death with arrows and spears, for to take them alive is in no way possible.”*

Marco Polo's unicorns were unquestionably rhinoceroses. He saw, or heard of them, in Burma and Sumatra, and says they were really as big as elephants, with a black and very

*Ibid., p. 27.

thick horn in the middle of the forehead, and he continues: " 'Tis a passing ugly beast to look upon, and is not in the least like that which our stories tell of as being caught in the lap of a virgin, in fact, it is altogether different from what we fancied.' " * The learned editor of Marco Polo, Col. Henry Yule, draws attention to the fact that the rhinoceros horn and the tusk of the narwhal were confused at a very early date, for Ælian, while giving for the unicorns a native name which appears to designate the rhinoceros, describes the horn as not straight but twisted, as is the tusk of the narwhal. †

A Latin work written between 1230 and 1244 by Thomas de Cantimpré (born 1201 at Leuwis near Brussels), a pupil of the famous Albertus Magnus, gives some curious particulars illustrating the ideas prevailing at that period regarding the whale, which was evidently confused to a certain extent with the narwhal. The Latin original of the book has never been printed, but there is an old German version by Konrad von Megenberg (born 1309) which faithfully renders the text; this runs in part as follows: ‡

"Cete [cetis] is a whale. This is the largest of all fishes, as Isidorus says. When young it has black teeth, which become white with age, and it has a bone or horn on the forehead. Some whales are so big that when seen from afar they seem like islands or groves, or resemble great hills. The whale heaps a thick coating of earth upon its back, so that when seamen are driven by stress of weather upon this earth, they imagine it to be an island and that they have come to land. Rejoiced at this they let down the sails, drop their anchor in the water, build a fire upon the earth and seek to enjoy a little rest. As soon, however,

* "The Book of Ser Marco Polo," trans. and ed. by Col. Henry Yule, 2d ed. London, 1875. Vol. II, pp. 89, 265, 266.

† Ibid., p. 273.

‡ "Das buch der Natur von Konrad von Megenberg," ed. by Dr. Franz Pfeiffer, Stuttgart, 1861, p. 247.

as the whale feels the heat of the fire, it becomes enraged and dives beneath the water, bearing down to the depths both ship and sailors. Although it is the biggest of all fishes, the whale has a small gullet, and hence only devours the little fish. These he entices to him by the sweet odour of the breath which comes from his mouth, and then swallows them down."

The Italian traveller, Ludovico Barthema, claims to have seen two live unicorns in Mecca, when he visited that city at the beginning of the sixteenth century, and gives a most conscientious description of their appearance. The body of the elder of the two animals resembled that of a colt thirty months old and had a horn "three *braccia*" in length (about 6 ft.) projecting from its forehead; the horn of the younger animal, about the size of a yearling colt, was about 16 in. long. Both animals were of dark-bay colour, and their heads were like those of stags; the neck was not very long and some short hair hung down on one side. The legs and the slightly cloven feet were like those of the goat. These "very remarkable objects," as Barthema truly characterizes them, had been given to the Sultan of Mecca by "a King of Ethiopia, that is by a Moorish King, as the finest things that could be found in the world at the present day."*

The two forms of ivory derived respectively from the walrus and the narwhal appear to have been well known to the Chinese at an early period.† The first direct evidence of this is to be found in the *Sung mo ki wên*, "Historical Memoranda Regarding the Kin Dynasty," the work of Hung Hao (1090–1155 A. D.), where this ivory is designated by

*"The Travels of Ludovico di Varthema," tr. by G. P. Badger, London, 1863, p. 46; Hakluyt Soc. pub., Vol. XXXII.

†For the details in this and the succeeding paragraphs we are indebted to the valuable paper by Dr. Berthold Laufer, entitled: "Arabic and Chinese Trade in Walrus and Narwhal Ivory," Oriental Printing Office, Leyden, 1913, 58 pp. A reprint from the *T'oung Pao*, Vol. XIV.

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the Khitan name *ku-tu-si*. It is said to be veined like (elephant) ivory, and to be of a yellow colour; its chief use was for sword-hilts or knife-handles; and Hung Hao denominates it "a priceless jewel." In an ancient glossary of Khitan words composed in the Liao period (907-1125 A. D.) this *ku-tu-si* is defined as "the horn of a thousand years' old snake," and this definition is supplemented by a statement of T'ao Tsung-i in his "Cho keng-lu," published in 1366, that it is "the horn of a large snake, and as it is poisonous by nature, it can counteract all poisons, for poison is treated with poison." This fancy indicates a transference to the *ku-tu-si* of the old belief touching the qualities of the rhinoceros horn as an antidote to poisons. That narwhal ivory should be represented as derived from "snakes' horns" is explained as a fanciful, half-poetic notion of the inland natives who worked this material and traded it with the Chinese, but to whom it had been brought from the far-distant north and who had no clear idea of what a narwhal really was; very possibly these supposed narwhal tusks were really fossil ivory from Siberia. Ko Hung, a Taoist writer of the fourth century A. D., represents the special virtue of rhinoceros horn as due to the fact that in the indiscriminate vegetable diet of this animal some poisonous herbs were included. The poison was attracted to the horn, and made it an antidote on the principle that like cures like.*

Two important passages in a mineralogical treatise by the Arabic writer Al-Bêrûnî (973-1048 A. D.)† describing a product called in Arabic *al-chutww*, are referred by Doctor Laufer to this *ku-tu-si* (walrus ivory). Al-Bêrûnî writes:

"It originates from an animal; it is much in demand, and

*Op cit., p. 11.

†Cited by E. Wiedemann in "Der Islam," Vol. II, pp. 345-358; "Ueber den Wert von Edelsteinen bei den Muslimen."

preserved in the treasuries among the Chinese, who assert that it is a desirable article because the approach of poison causes it to exude. It is said to be the bone from the forehead of a bull. Its best quality is the one passing from yellow into green; next comes one like camphor, then the white one, then one coloured like the sun, then one passing into dark gray. If it is curved, its value is a hundred *dînâr* at a weight of one hundred drams; then it sinks as low as one *dînâr*, regardless of weight."

In another passage this writer states that the "bull" furnishing this horn was said to have its habitat in the country of the Kirgiz, northern Turks. The "Bulgar" brought from the northern sea teeth of a fish over a cubit in length, from which knife-handles were sawed out. If a whole tooth were not available, separate pieces were joined together to form the handle. That the material used was not elephant ivory was quite evident, as in most cases the tooth constituting the handle had been left essentially in its original form. Some of the knife-handles even found their way to far-off Mecca, where the material was known as "white" *chutuw*, and so prized was it among the Egyptians that they were willing to pay "two hundred times its value" for it. Finally the writer casts doubt on the assertion that the *chutuw*, properly so called, was really found among the Kirgiz, and thinks that it also was the main portion of a tooth or horn.*

The first definite and accurate knowledge of walrus ivory was brought to Europe by the bold Norse navigator, Othere of Helgeland, Norway, on his return from a voyage made by him, at a date between 870 and 880 A. D., around North Cape and to Perm. The Norse captain reported the results of this trip to King Alfred the Great, his chief object being

*Dr. Berthold Laufer, "Arabic and Chinese Trade in Walrus and Narwhal Ivory," pp. 1, 2. Reprinted from the *T'oung Pao*, Vol. XIV.

to secure *horsevael* ("horsewhales") "which have in their teeth bones of great price and excellence."*

In the fourteenth century the Scandinavian saga of Krokka, the crafty, who lived in the tenth century, makes the statement that the three most precious things that Gunner, prefect of Greenland, could obtain in the island, when he sought to propitiate King Harald Hardraad of Norway, in 1050 A. D. by the bestowal of the most valuable gifts at his disposal, were a white bear, a set of chessmen carved out of walrus ivory, and a gold-inlaid skull of a walrus with the teeth still in place.† A curious specimen of such a chessman in the British Museum, carved from this kind of ivory, closely resembles the pieces of a nearly complete set found in 1831 in the Scotch Island of Lewis.

Touching the use of walrus ivory in the Middle Ages it has been noted that in northern Europe, in Germany, and in the Netherlands, for example, while elephant ivory was freely and principally used during the ninth and tenth centuries, a large proportion of the carvings executed there during the eleventh and twelfth centuries were of walrus ivory.‡

In "Hakluyt's Voyages" we read that when Jacques Cartier discovered the Isle of Romea, in 1534, he reported the finding there of "very great beasts" as large as men, and having "two great teeth in their mouths like unto Elephant's teeth." Hakluyt, after giving the Latin names *boves marini* and *vaccæ marinæ*, says they were called, in the Russian tongue, "morsses." These teeth were sold in England "to the combe and knife-makers at 8 groats and 3 shillings the pound weight," while elephant ivory only brought half as much;

*In the first chapter of King Alfred's edition of the "De Miseria Mundi" of Paulus Orosius. See Laufer, op. cit., p. 25.

†William Maskell, "Ivories Ancient and Medieval," London, 1875, p. 80, citing a paper read before the Society of Antiquaries in 1832 by Sir Frederick Madden.

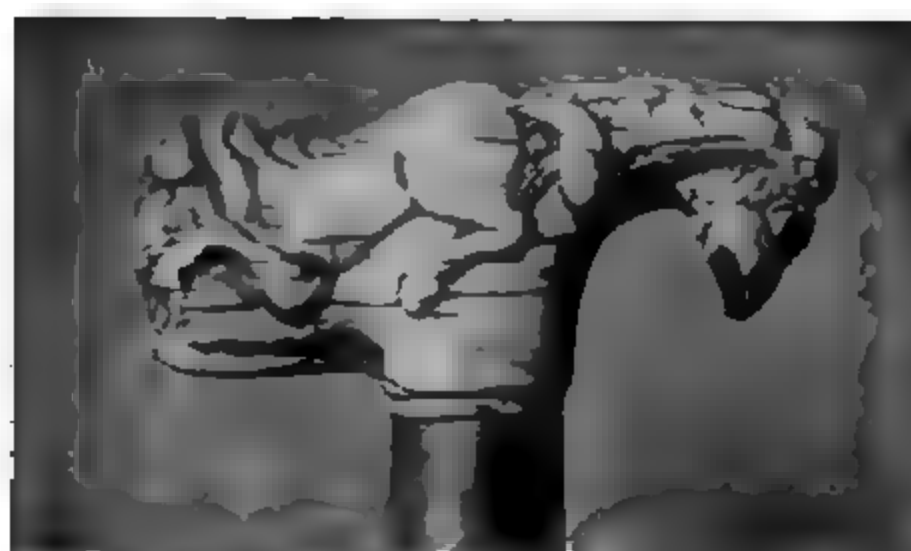
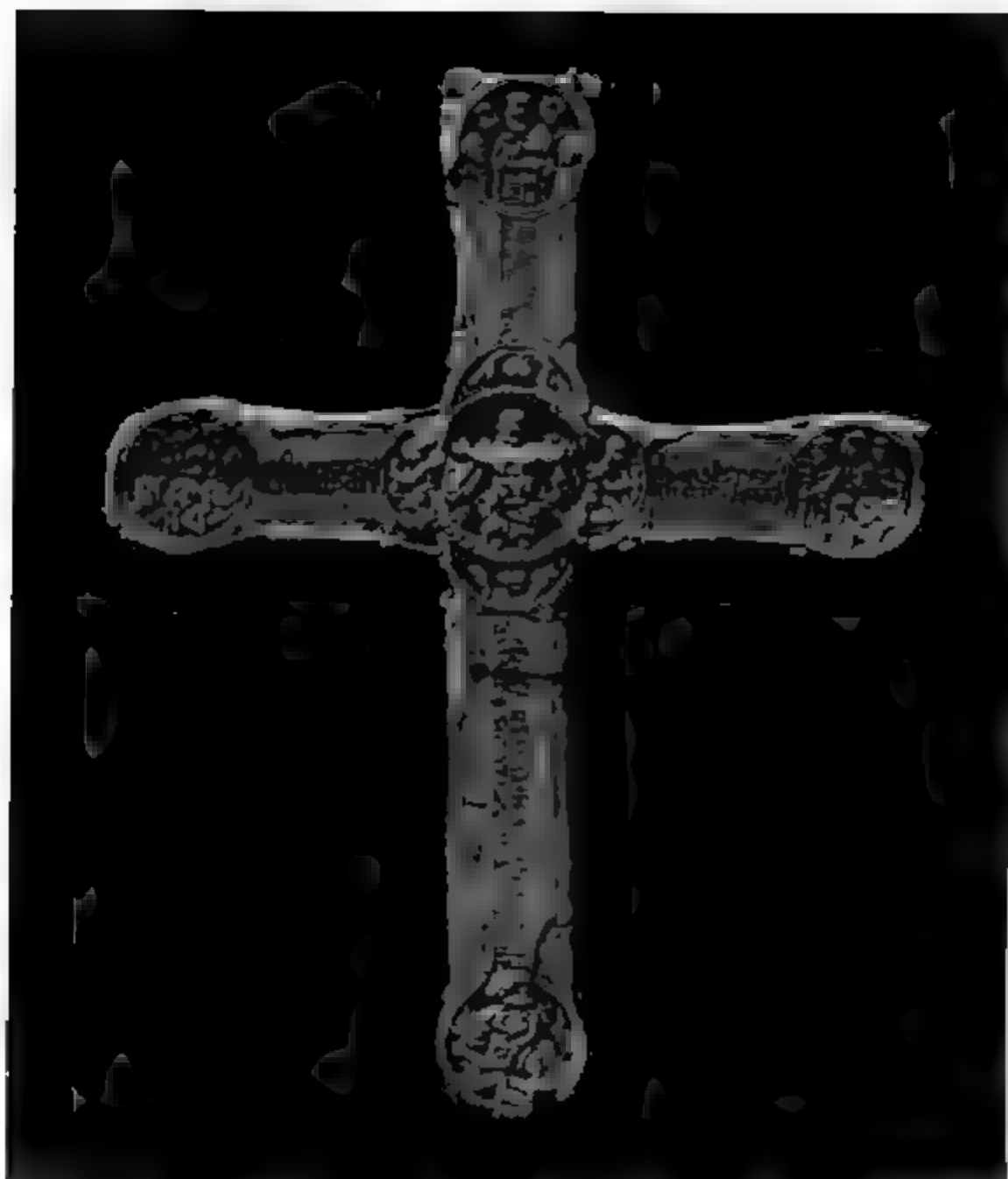
‡M. Digby Wyatt, "Notices on Sculpture in Ivory," London, 1856, pp. 10, 11.



WHALEBONE PLAQUE

**CARVED WITH REPRESENTATION OF THE ADORATION OF THE MAGI. ENGLISH
(WINCHESTER SCHOOL); ABOUT 1000 A. D.**

VICTORIA AND ALBERT MUSEUM



CRUCIFIX OF PRINCESS GUNHILDE
 WALRUS IVORY. SCANDINAVIAN-BYZANTINE ART OF XI CENTURY
 ROYAL MUSEUM, COPENHAGEN

WALRUS IVORY TAU-HEAD
 NORTH EUROPEAN XII CENTURY
 VICTORIA AND ALBERT MUSEUM

the grain of this "walrus bone" was in his estimation "somewhat more yellow than the Ivorie." A Mr. Alexander Woodson, of Bristol, "my old friend, an excellent mathematician and a skilful Phisitian," showed him a walrus tooth a half-yard long, and assured him that he had found this material to be "as soveraigne against poyson as any Unicorn's horne."*

The name walrus, Dutch *wallrus*, has the same significance as the chronological prototype in Skandinavian, *rosmhvalr* ("horsewhale"), only the order of the two elements is reversed. The Latinized form *rosmarus* is from the same source, for the early French settlers in Canada it was "la bête à grande dent," the "animal with the great tooth." The Russian name *morzh* furnishes the form "morse" used quite often in English a hundred or more years ago, and its likeness in sound to the Latin *mors*, "death," induced some sixteenth-century writers to connect it with this, supposing that the creature's dangerous character had caused the bestowal of this name.†

As far back as the third century, Solinus (Polyhistor, Chap. XXXV) makes mention of sword-hilts made by the Irish from the teeth of a marine animal, perhaps the narwhal, which, although commonly confining itself to the far north, has been occasionally, though rarely, met with to the southward, one having even been found stranded at the mouth of the Elbe, in German waters.

Of walrus ivory, the largest supply in comparatively recent years seems to have come from Bering Sea. For several years prior to 1870 as much as 100,000 pounds of walrus ivory is said to have been annually collected here, this representing an annual slaughter of 6,000 walruses. In later years still larger numbers were killed, as many as from

*"Hakluyt's Travels," Glasgow, 1904, Vol. VIII, pp. 156, 157, "A brief note of the Morse and the use thereof."

†Dr. Berthold Laufer, "Arabic and Chinese Trade in Walrus and Narwhal Ivory," Leyden, 1913, p. 43, note.

10,000 to 12,000 each year. This could not long be kept up, and finally the walrus herds became so thinned out that their pursuit ceased to be profitable. Protective legislation is strongly urged to forestall the threatened extermination of the animals, as not only the quite practicable legitimate pursuit of them is checked, but the many natives of the region who depend on the walrus catch for subsistence have been reduced to serious straits.*

Narwhal and walrus ivory seem to have come in limited quantity to the Japanese, even before Dutch and Portuguese traders brought it in. A description, and even a sketch of the animal, were given to their countrymen by some Japanese sailors who had been shipwrecked on the Aleutian Islands.† Now and then, once in a great while, some chance or mishap has caused the appearance of a stray specimen of the species in Japanese waters. Both walrus and narwhal ivory have been used by Japanese carvers for their famous *netsukés*. Of the narwhal "horn" similar tales were told in Japan as in medieval Europe—namely, that it was a "unicorn's horn" and an infallible antidote to poison; as such it was valued at more than its weight in gold. All these fancies were undoubtedly brought to Japan by the Dutch and Portuguese traders, who were clever enough to turn to profitable account any "fairy tales" which they heard.

Walrus ivory (*sir mahi*) was the material of an elaborately ornamented sword-hilt made in Ulwar, India, in 1861. At the top and ends of the cross-bar are placed golden tigers' and lions' heads, forming a very bold and effective decoration.‡

These forms of ivory have been utilized by the Eskimos

*J. A. Allen, in *Amer. Mus. Jour.*, 1913, p. 42.

†Given in A. E. V. Nordenskjöld's "Die Umsegelung Asiens und Europas," Vol. I, p. 140, as noted by Laufer, *op. cit.*, p. 38, note.

‡Col. T. H. Hendley, "Indian Animals, True and False, in Art, Religion," etc.; the *Journal of Indian Art and Industry*, Vol. XVI, No. 126, April, 1914, Pl. XIII, Fig. b.



WALRUS IVORY

- I. SECTION OF WALRUS TUSK FROM ALASKA
- II. DIPPER MADE OF RICH GOLDEN YELLOW IVORY, BY ESKIMO OF KOTzebue Sound.
- III. HARPOON HEAD MADE OF WALRUS TUSK. NEWARD PENINSULA.

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with a surprising amount of skill for the production of artistic objects. The clever Korjak use for their purpose both walrus and mammoth ivory, mainly the first-named variety, and also sometimes take their material from the narwhal tusk, or "horn." This preserves its whiteness better than walrus ivory, which is apt to turn quite yellow after a certain length of exposure to air and moisture. The ivory carvings executed by the maritime Korjaks have received high praise for their lifelike character, notably the figures of wrestlers and drummers produced by them. Their work in this respect is pronounced to be superior to that of any other of the Eskimo tribes. Thimbles and rings, as well as charms, the latter cut from a single piece of ivory, are also made by them.*

It was from this far-away region of northeastern Asia that the Chinese derived their *ku-tu-si*, not indeed directly but by way of Korea, Khitan, and other intervening regions. That walrus ivory was used by the far-northern tribes of the Pacific coasts at a very remote period seems to be indicated by a passage in the Chinese "Annals of the Three Kingdoms," where it is stated that among the articles of tribute sent in 262 A. D. from the country of the Su-shén were suits of "bone-armour." This use of bone-armour is only noted in the case of the tribes of the northern Pacific region, and this type of bone-plate armour can still be found with the Eskimo and the Chukchi, walrus tusks having generally furnished the material. Doctor Laufer draws attention to the fact that this Chinese record of 262 A. D. is, if correctly assumed to mean armour made of plates of walrus ivory, the earliest dated mention of an object manufactured from this substance.†

*Dr. Berthold Laufer, "Arabic and Chinese Trade in Walrus and Narwhal Ivory," Leyden, 1913, p. 33.

†Op. cit., pp. 36, 37; see also *Science*, Vol. 37, 1913, p. 342, where there is an abstract of an address on "Plate Armour in America," delivered by Doctor Laufer before the American Anthropological Association at Cleveland on January 2, 1913.

The ingenuity and skill of the Eskimos of Alaska in utilizing fossil and walrus ivory is shown by the considerable variety of objects produced by them from this material. Some of the most useful and beautiful are the ornamentally cut and etched fastenings in walrus ivory for the "housewives," or bags, used by the Eskimo women to hold their sewing materials, tools, etc. In the examples figured, the material came from the Bering Sea coast of Alaska, at the mouth of the Kuskokwoni River. Other Eskimo work in this material appears in a very delicate and carefully executed bit of carving representing a salmon; this comes from St. Michael's, Alaska. We have also two buttons, showing composite animal forms, from Kotzebue Sound. The fine and really artistic work on these objects, wrought by deft touches of the carver's tools, will excite the surprise of those who consider our Alaskan Eskimo to be utterly uncivilized.

Polished sections of walrus tusks, from St. Michael's, Alaska, and a number of water-worn pebbles of this material, varying in size from 1 to 6 in. long, from the Alaskan shores of Bering Sea, illustrate the form and condition of the walrus ivory used by the Eskimos and so skilfully worked by them. Another interesting example of work in this type of ivory is afforded by a harpoon-head of the kind used in the capture of whales; this comes from the Seward Peninsula, Alaska. An Eskimo fish line, from the Bering Sea coast of Alaska, consists of a line of twisted sinew, hooks of bone and metal, and a sinker of an old, beautifully coloured piece of walrus ivory. A gauntlet implement from the Bering Sea coast is another good example of Eskimo work in this material. The whalers do a thriving trade in walrus tusks, which they string together with a rawhide line traversing holes bored through the ends of the tusks.

In the collection of Lieutenant Emmons is a dipper of mammoth ivory from Kotzebue Sound, of exquisite rich

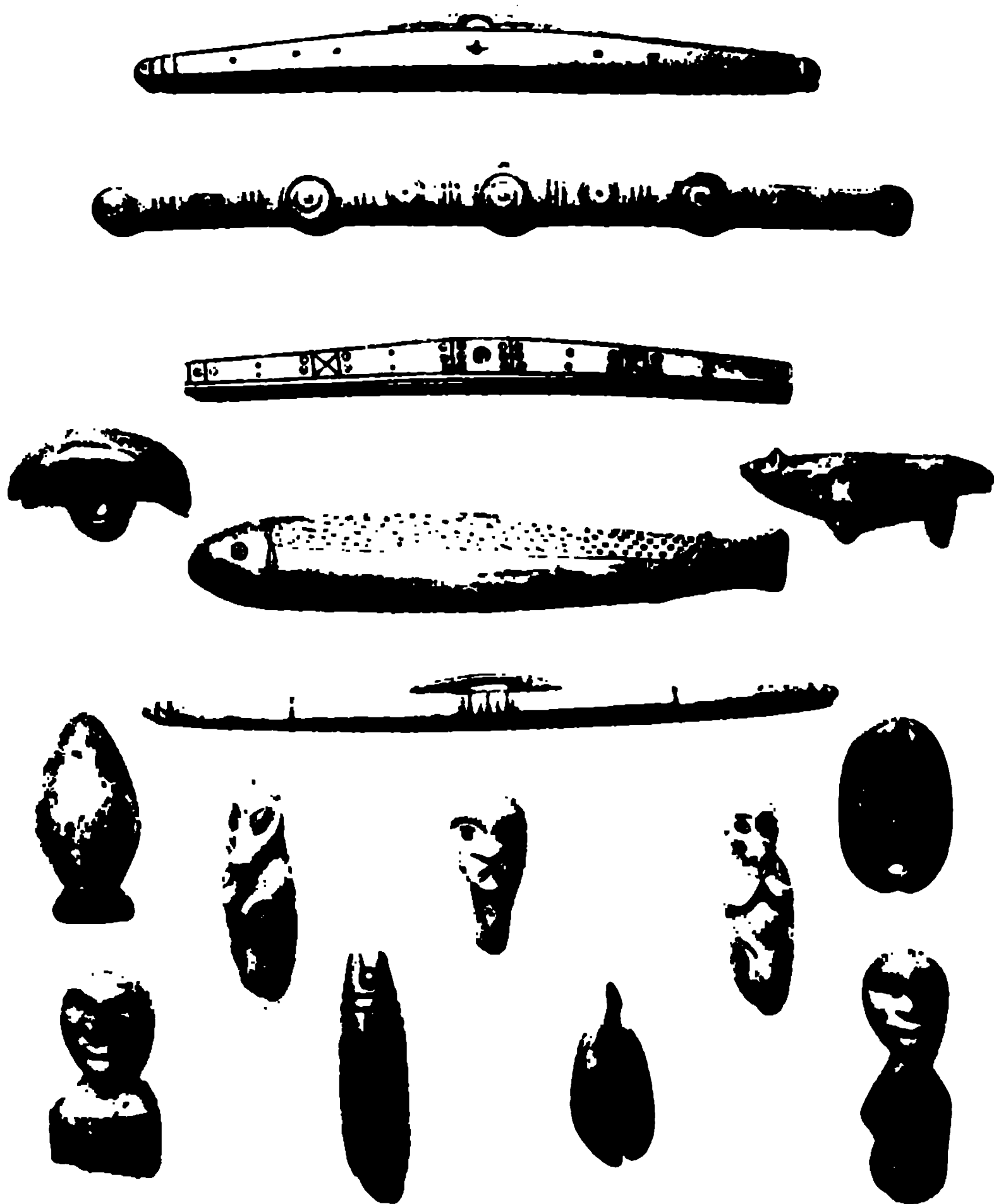


SECTIONS OF WALRUS TUSK

CUT AND POLISHED, FROM ST. MICHAELS, BEHRING SEA COAST OF ALASKA

FISH-LINE COMPLETE

WORK OF ESKIMO ON BEHRING SEA COAST OF ALASKA. CONSISTS OF A LINE OF TWISTED SINEW, HOOKS OF BONE AND METAL, AND SINKER OF AN OLD, BEAUTIFULLY COLOURED PIECE OF WALRUS IVORY. IN LOWER RIGHT HAND CORNER A DECORATED WALRUS-IVORY SINKER. COLLECTION OF COMMANDER G. T. EMMONS



ESKIMO IVORY CARVINGS

CARVINGS OUT OF WALRUS IVORY BY THE ESKIMO OF THE BEHRING SEA COAST OF ALASKA

- I-III. IVORY FASTENERS OF ESKIMO "HOUSEWIVES" OR WORKBAGS
- IV. TOGGLE OR BUTTON OF WALRUS IVORY
- V. CARVING IN WALRUS IVORY, REPRESENTING A SALMON
- VI. TOGGLE OR BUTTON REPRESENTING A SEAL DIVING
- VII. FASTENER OF WORKBAG
- VIII-XVI. DOLLS' HEADS, ETC.

COLLECTION OF COMMANDER G. T. EMMONS

brown colour, showing the true ivory structure but resembling the brown beach pebbles in colour. Ivory has also been used for two toggles or buttons, one representing a seal diving and the other a whale, the first material from Port Barrow and the second from the Alaskan shores of Bering Sea. Other ivory carvings are dolls' heads, also from the Bering Sea coast.

The mammoth ivory is collected by the natives on the banks of the rivers which flow into Kotzebue Sound, the old deposits being gradually uncovered by the spring freshets, and also by the recession of the ice cliffs. The very old tusks, which have begun to turn blue, are sometimes pulverized, and a blue paint is then made from the powder, with which masks, beluga hats, finger-rattles, and the like are decorated. From the better pieces various useful objects, such as ladles, spoons, skin-scrapers or fat-scrapers, etc., are made.

In southeastern Alaska the natives secure pieces of walrus tusk in trade, and of these they occasionally make very striking necklaces; some of these are quite artistically carved. They are chiefly used for the adornment of the Shamans, or wonder-working priests of this primitive race. Some of these pieces are of a rich deep brown tint, while others resemble fine amber in their colouring.*

The walrus is a pinnipedian of the family *Trichecidæ*, of which there are two species, *Trichecus rosmarus*, in the Arctic Ocean on the shores of Greenland, and *Trichecus obesus*, found in the region of Bering Strait. The narwhal belongs to an entirely distinct order, the Cetacea, of which it is the species *Monodon monoceros*, of the sub-family *Delphinapterinæ*. It does not find its way as far south as does the walrus, rarely appearing below 65° North latitude. The tusk (there is usually but one) of the male projects through

*The collection shown in the plate was sent by Mr. G. F. Emmons, with a personal communication embodying the information given above.

the upper lip, and is believed to have been evolved through the advantage it afforded in breaking the ice so as to permit the creature to breathe, or perhaps as a deadly offensive weapon. The pair of tusks of the walrus are, so to speak, developed "canine teeth," and extend directly downward from the jaw.*

China affords a good market for horns of the deer, reindeer, and wild sheep, as they are quite an important element of the Chinese pharmacopœia. After having been reduced to a powder this is mixed with other ingredients and serves for composing pills and other medicinal preparations, the pills being highly prized for their supposed tonic qualities, and being much favoured by the aged and those in a debilitated state of health. In view of this use the Chinese lay great stress upon the perfect condition of the horns; there must not be a blemish or scar on them. Reindeer horns are now mainly obtained from Siberia whence they are brought, by way of Vladivostock, to Hongkong. China itself (principally the mountainous part of the western regions comprised in the provinces of Szechwan and Yuman) furnishes stag horns in abundance, while the horns of the wild sheep are usually brought from the mountainous tracts along the frontiers of Indo-China, Siam, and the Malay States. It is suggested that both reindeer horns and stag horns could profitably be exported to China from Alaska and elsewhere within the territorial limits of the United States. To be received in satisfactory state no salt or preservatives of any kind should be used for the shipments, the horns being shipped dry in sealed cases some time in the course of the winter season. Prices in China vary much, according to the quality of the material, and where the skull is sent with the horns still attached, these are worth some

*Dr. Berthold Laufer, "Arabic and Chinese Trade in Walrus and Narwhal Ivory," p. 18, note. Reprinted from the *T'oung-Pao*, Vol. XIV.



EXPERT CHINESE IVORY CARVER
CANTON

20 per cent. more than they would be if separated. Reindeer horns bring from \$4.30 to \$6.70 gold per pound (\$9 to \$14 of the local money); these horns weigh from two to ten pounds each, from thirty to forty being packed in a single case. For stag horns, if of superior quality, much higher prices are paid, sometimes as high as \$9 in gold per ounce; the weight of these horns runs from four to fifteen pounds. Wild sheep horns are cheaper, fetching from \$3.60 to \$5.75 gold per ounce.*

Horns of various kinds find use as amulets in Spain, more especially for donkeys or mules; one of these is a deer's horn through which has been passed an iron loop for suspension. Usually when several of these animals are driven into a Spanish town from the country, only the leading donkey bears such an amulet, or perhaps two of the animals. They are almost exclusively employed by the peasants, the dwellers in the towns rarely having recourse to them, and the peasants are generally very loath to sell them, probably from the fear that ill-luck may result from parting with one. Bone amulets fashioned into the form of a horn are worn by children in Seville, Granada, and other Spanish cities, as charms against the Evil Eye and against the ailments incident to teething. In parts of Andalusia the superstition exists that if an envious or otherwise evil glance falls upon a child, the full force of the malevolence is spent upon the guardian amulet, which will break under the strain, but saves the infant from harm. Another child's amulet in this country is a boar's tusk, sometimes mounted in silver, and one specimen from Seville with chains attached was asserted to have been worn by a woman as a lactation amulet.†

*Consul General George E. Anderson, of Hongkong, "Deer and Reindeer Horns in China," in *Daily Consular and Trade Reports*, February 5, 1914, p. 469.

†W. L. Hildsburgh, "Notes on Spanish Amulets," *Folk Lore*, Vol. XVII, 1906, pp. 454-472. See Pl. IV, Fig. 1, and Pl. VII, Figs. 6, 7, 8, 9, 16.

In Bohemian sepulchres of neolithic age at Lobositz, Melnik, and Gross Zernosek many imitation bone teeth have been found as well as natural teeth of the horse, the hog, and the dog; occasionally stag's teeth occur. All these are perforated for suspension and were worn as amulets, and perhaps as ornaments also.*

The Mound-builders of Ohio have left relics testifying to the use of animal teeth as amulets among them. In the Seip Mound in Point Creek Valley, Ohio, Mr. William C. Mills found several such teeth, some of the bear, and others of the alligator, which had been perforated for suspension or attachment; one of the alligator's teeth was $2\frac{1}{2}$ in. long and nearly $\frac{3}{4}$ in. in diameter. This appears to be the first instance of the finding of alligators' teeth in Ohio. The bears' teeth were cut horizontally into halves, each section being carefully polished. The Seip Mound covers the site of a charnel house, consisting of three distinct sections. Here the bodies of the dead were burned and their remains laid in graves within the building. After a time the edifice itself was destroyed by fire and an immense mound raised over it as a monument to all the dead whose remains rested in it.† The use of bears' teeth for adornment or as amulets was very widespread among the American Indians, and human teeth also, perforated so as to be strung and suspended, have been met with among the relics of the Southern Indians.‡

With the Norwegian Lapps also, bears' teeth are valued for their supposed curative powers. In cases of toothache the application of such a tooth to the swollen gum is highly recommended. It must first be warmed slightly and then wrapped up in a thin cloth and pressed firmly against the

*Weinzierl, "Neolitische Schmuck und Amulette in Böhmen," in *Zeitschrift für Ethnologie*, 1895, pp. 352-357. See Fig. 1, p. 353.

†Mills, "The Seip Mound"; in *Putnam Anniversary Volume*, New York, 1909, pp. 121-122.

‡Jones, "Antiquities of the Southern Indians," New York, 1873, p. 520.

aching tooth. The same service is believed to be rendered by a reindeer's jawbone which has been buried so long in the earth that it has assumed an earthy or greenish hue; this is to be applied in the same way as the bear's tooth. In both cases whatever good results are accomplished are, of course, due to the effect of heat.*

The Mohammedan emblem of the crescent and the star is believed by Professor Ridgeway to have been in part derived from the boars' tusks used as amulets in many parts of Europe in ancient times. However, as these amulets were intended to figure the new moon, the Mohammedan emblem was in any case, indirectly, an astrological symbol. Even in the Swiss Lake Dwellings representations of the moon have been found, indicating that already, in prehistoric times, that luminary was an object of adoration. A curious circumstance in regard to the Mohammedan emblem of crescent and star is that the latter symbol probably refers to the Star of Bethlehem, which was figured in connection with the crescent on certain Byzantine coins. Possibly the virtues ascribed to various teeth and horns, notably to tusks of the narwhal, long believed to be horns of the fabulous unicorn, may have been due to the prevalent association of such curved forms with the new moon.

Many primitive amulets consisted of objects hurtful to man, such as the teeth, the horns, or the claws of wild animals. This arose from the belief that what was feared by man would also be feared by the invisible spirits who might wish to harm him. A similar idea suggested the use of thistles and of the thorns of plants for a like purpose. Certain African tribes even place poisonous herbs in small horns or balls and wear them as amulets. It was a diametrically opposite idea that suggested the use of beautiful

*Johan Turi, "Muittalus samid birra: en bok om Lappernes liv."; text, and Danish trans. by Emilie Demant, Kjöbenhavn, 1911, p. 192 (p. 70 of text).

objects in this way, such, for instance, as glittering pebbles, coloured stones, pearls, and coral. Here the spirits were to be won over by the beauty of the ornament, so that they would lay aside their enmity and become friendly and helpful. To still another class belong those amulets representing a hand raised on high with the palm outward, figuring the gesture of one who seeks to ward off approaching danger, and also the numerous phallic amulets, especially popular in Italy in ancient times, and still used there in a modified form as a protection against the Evil Eye. This latter type is believed to have been intended to express derision and contempt, the wearer believing that witches and evil spirits were robbed of their power when they were treated as despicable and contemptible.*

This idea is not altogether so foolish as it may seem to be, for we know to-day that the mental attitude of an individual is a very potent factor in conserving health or inducing disease, and if those who fancied themselves to be the victims of witchcraft or demoniacal possession could only be made to laugh at their tormentors, they would probably soon be cured of their imaginary, and perhaps even of their real, ailments.

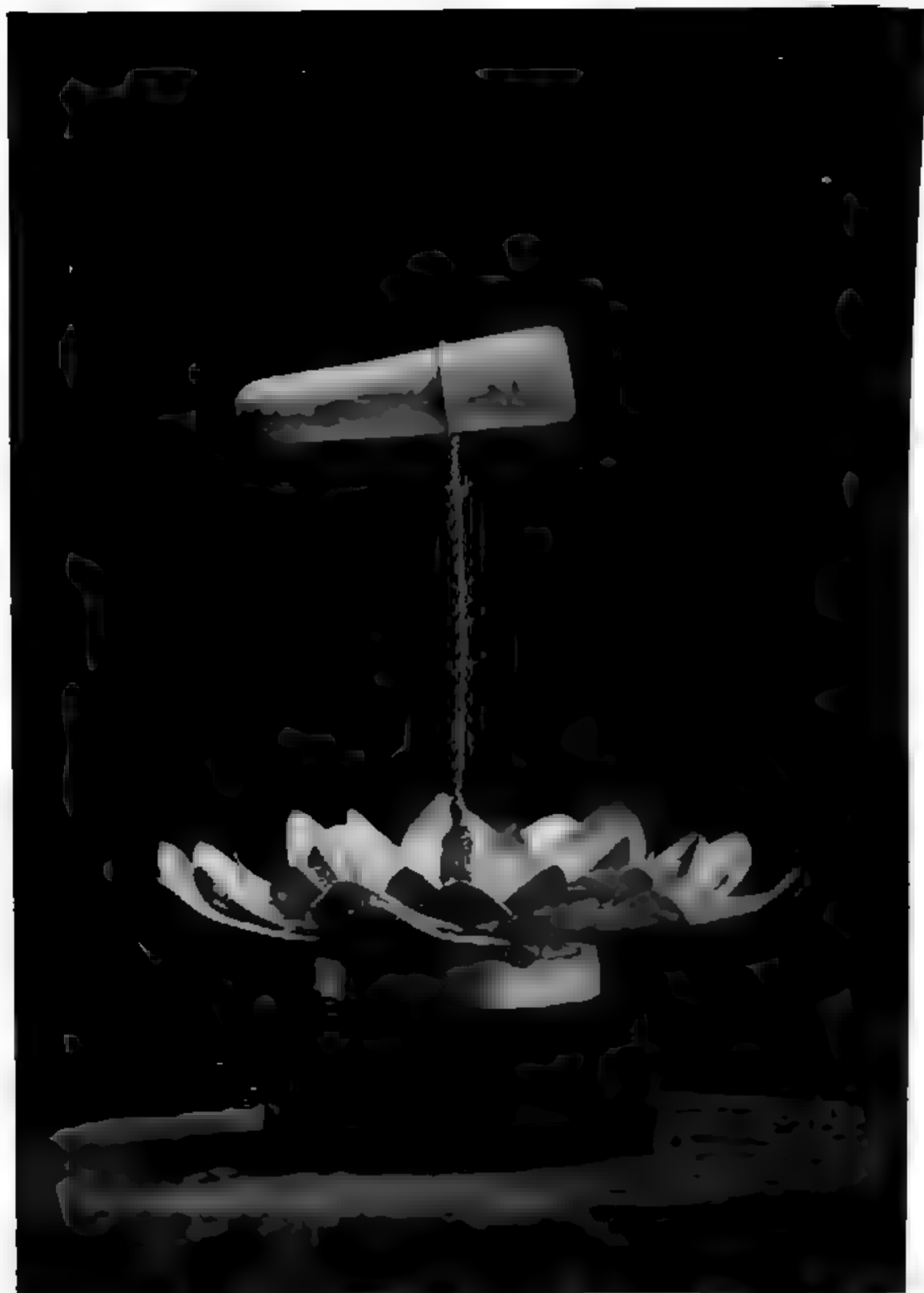
Pliny frequently mentions the medicinal uses of teeth, both human and animal. Quite naturally, according to primitive ideas, a tooth was thought to be a sovereign remedy for toothache. The best effect was attained by burning a tooth taken from some one of the same sex as the sufferer, and fumigating the painful tooth with the smoke. For uterine diseases an effective cure was promised if the first tooth lost by a child was set in an arm-band and continually worn on the arm. It was, however, requisite that this tooth should not have been permitted to fall to the ground.†

*Schurtz, "Urgeschichte der Kultur," Leipzig und Wien, 1900, p. 599.

†C. Plinii Secundi, *Naturalis historia*, Lib. XXVIII, cap. 4, Venetia, 1507, Fol. 208 verso.



TEMPLE AT KANDY, CEYLON
WHERE THE SACRED TOOTH-BELIC OF BUDDHA IS KEPT



"THE TOOTH OF BUDDHA"

THE GREAT SACRED RELIC OF CEYLON. THIS IS CARVED OUT OF IVORY AND TAKES THE PLACE OF AN OLDER AND EQUALLY APOCRYPHAL TOOTH RELIC DESTROYED BY THE PORTUGUESE IN THE XVII CENTURY. EXACT SIZE.

If we are willing to accept the statement of the Portuguese, Captain João Ribeyro in his "History of Ceylon" written in 1685, and presented to the King of Portugal,* the venerated tooth of Buddha, so jealously preserved in the Island of Ceylon, was the tooth of an ape. Constantine of Braganza seized it in 1560 and in his religious zeal preferred rather to have it burned and the ashes scattered over the sea than to accept the 800,000 francs offered as redemption by the King of Pegu. However, the Cinghalese priests proved equal to the emergency, and spread the report that the sacred tooth had, by its own miraculous virtue, escaped from the hands of the Portuguese, and had passed through the air until it finally found a resting place on a rose; here it was duly found by faithful Buddhists and replaced in its shrine. What purports to be a tooth of Buddha is to be seen here at the present day, although irreverent unbelievers insist that this tooth, which is 3 in. long, is in reality a shaped piece of ivory.†

The veneration of the supposed tooth of the Buddha in India finds a kind of parallel in the honour bestowed upon the teeth of the reigning sovereigns of Cassange, in Angola, Africa. When one of these kings or *jagas* dies, one of his teeth is drawn from his jaw and reverently placed in a box which contains a tooth of each of his predecessors. This tooth-shrine is considered the most precious of the crown treasures, and its ownership serves to legitimize each of the successive kings of Cassange.‡

Many superstitions exist as to the teeth and teething, one of them being that when the teeth are slow in cutting

*J. Ribeyro, "Histoire de l'Isle de Ceylon," French transl. by Abbé le Grand, Amsterdam, 1701, pp. 118, 119; note of Abbé le Grand.

†Eliza Ruhamah Scidmore, "Adam's Second Eden," in *National Geographic Magazine*, Vol. XXIII, No. 2, p. 206; February 1, 1912.

‡F. C. Valdez, "Six Years of a Traveller's Life in Western Africa," Vol. II, pp. 161 sqq. cited in J. S. Frazer's "The Dying God," London, 1912, p. 203.

through the gums this is a sign that the baby when grown up to manhood will be successful in all undertakings. On the other hand, if the teeth appear soon and without difficulty, the child is doomed to an early death, according to the old English proverb "Soon toothed, soon turfed." Some savage African tribes go so far as to kill those infants whose upper teeth appear before the lower ones, or else these children are sold to slavery, in order to save the tribe from the misfortunes which are sure to overtake them in after life.*

When one of the children of a Lapplander loses a first tooth, this is to be cast into the fire, while a petition is recited that a new tooth be given in place of the one that has been committed to the flames. Another version of this old superstitious rite prescribes that on throwing the tooth into the fire the following words should be pronounced: "Fire! Fire! here you have a worthless tooth, give me a silver tooth."†

A ghastly tooth-amulet is reported to be worn by natives of the Island of Kiriwini, one of the Trobriand group in the South Pacific. Here the widow is said to wear, suspended from her neck by a string, the lower jaw of her late husband with its full complement of teeth or as many as he was blessed with when he died.‡ Whether this is designed to frighten away possible suitors and thus better enable the widow to guard sacredly her husband's memory, or whether it is supposed to ensure her the protection of the departed spirit, is not easy to determine; possibly the teeth may serve both ways.

Although the strange preference for black teeth that exists in some Oriental lands may not be due to any superstition, but rather to what we must regard as a perverted taste, one

*Parmele, "Tothe-lore," *International Dental Journal*, January, 1899, p. 2.

†Torsen Kalmodin, "Lapparne och deres Land; Skildringar och Studier," Stockholm, 1914, Pt. III, p. 8.

‡Brown, "Melanesians and Polynesians," New York, 1910, p. 238.

phase of the custom is so singular that it deserves mention here. When a Siamese seeks to repair the ravages of time by ordering a set of artificial teeth, he usually requires that they shall be black; sometimes, however, in the case of functionaries who often receive Europeans, a set of black teeth is ordered for general use, and a set of white teeth to be substituted when European visitors are to be entertained. When asked to give a reason for this strange custom of blackening the teeth, or wearing black teeth, a Siamese replied: "We do not wish to have teeth like those of a dog."

The teeth of various animals were also regarded as possessing curative powers. For instance, if the tooth of a mole were taken out while the creature was alive, it was a specific for toothache when attached to the body.* Violent pains in the gastric region were removed by binding on, with a piece of sheep's or goat's skin, a tooth drawn from the left side of a hyena's jaw. A wolf's tooth preserved an infant from fear, if attached to its body, and also cured toothache. The larger teeth of the wolf were supposed to have the power to make horses tireless runners.† It is interesting to note in this connection that there were found in the Crimea, in 1865, beneath a tumulus, the remains of five horses, the heads being adorned with perforated boars' tusks set in gold and silver.‡

That this superstition, once so deeply rooted, has not yet passed away, is illustrated by the specimens figured by Bellucci. One of these, taken from a prehistoric necropolis of the first Iron Age, is the tusk of a boar and has been partly metamorphosed into odontolite—bone turquoise coloured by coming into contact with some iron or iron salt. It has a bronze mounting at the base to facilitate its suspension

*C. Plinii Secundi, *Naturalis historia*, Lib. XXVIII, cap. 8, Venetia, 1507, fol. 211 verso.

†Ibid., Lib. XXVIII, cap. 19, Venetia, 1507, fol. 218 recto.

‡Stephani, *Compte rendu de la Comm. arch. de St. Petersb.*, 1865, p. 19.

from the body of the owner. The other specimen, also a boar's tusk, is a modern amulet from Perugia, and represents a type in common use in Italy against the Evil Eye or similar spells. Such amulets are also given children to wear as an aid to their dentition.*

Boars' tusks were regarded as valuable remedies for bronchitis, pleurisy, and other internal inflammations, resulting from a congestion of the blood vessels, or from coagulation of the blood.† The fact that very severe and painful wounds were often inflicted by wild boars doubtless led to the belief in their virtue to cure blood diseases and inflammations.

The hoof of the "Great Beast," highly prized by many Italians as an amulet against poison, witches, and the Evil Eye, was in former times a piece of the hoof of a rhinoceros; but in view of the difficulty in obtaining such fragments, the hoof of the elk has been substituted. The amulets formed of this material are generally shaped into small tablets; they are often bordered with silver and provided with two rings on either side, by means of which the object is attached either to a ribbon, or to the two extremities of a coral necklace. Sometimes the amulet consists of a silver heart marked with the monogram of Christ and the three sacred nails, a piece of the elk's hoof being set in the reverse side. Here, as in so many other Italian amulets, the sanction of the Church has given added virtue to the pagan amulet.‡

The superstition in regard to the good fortune brought by wearing elk teeth, and the use of them to adorn the insignia of the widespread Order of Elks, has led to a very great demand for these teeth, a demand far exceeding the normal supply. Those having a number of circles and of a light

*Bellucci, "Il feticismo primitivo in Italia," Perugia, 1907, p. 35 (2 figures).

†Valentini, "Museum museorum, oder Vollständige Schau-Bühne," Franckfurt am Mayn, 1714, Bk. III, cap. 17, 3, pp. 454.

‡Bellucci, "Il feticismo in Italia," Perugia, 1907, pp. 111-113. (Figures.)

brown colouring, both indications of age, are the most highly valued, and the Indians, who are chiefly depended upon to supply the market with these teeth, have succeeded in imitating the old ones by burning circles into teeth from young elks with a hot iron or stone. Attempts are said to have already been made to corner the market in this commodity, one dealer having collected an enormous number of elk teeth which he is holding in the hope of realizing a great profit on them at the high prices likely to prevail later on, when the difference between the supply and the demand shall have become even more accentuated than at present.

Elks' teeth having become highly prized charms, as in most other similar cases, the demand for the genuine article has developed a trade in spurious teeth. Quite recently a man was prosecuted by the Federal authorities for having offered to sell elks' teeth in large quantities for \$2 each, filling the orders he received with imitations of walrus ivory. The work was cleverly done and the deception might not have been soon discovered had not the low price caused suspicion and examination, as others offered the teeth for \$1.50 and even for \$1 each. A genuine tooth is worth from \$5 to \$25, according to quality, as the supply is decreasing while the demand increases. The writer has seen a twinned pair of elk teeth valued at \$150.

The Eskimo women of Alaska regard the canine-tooth of the polar bear as a most precious amulet. To secure the full effect of its virtues it must be strung on a seal-skin string which is then bound about the body beneath the breasts. Worn in this way such an amulet assures an abundant supply of milk, and hence may be considered as protecting and favouring the Eskimo babe to an even greater degree than it does the mother.*

*Murdock, "The Port Borrow Eskimo," Ninth Rep. Bur. Am. Ethn., 1887, 88; Washington, 1892, p. 437.

During the Revolutionary period ivory busks were worn in ladies' bodices. A century ago whales' teeth were engraved by whalers on the New England coast, usually with a pocket-knife, an operation often requiring many days for its execution. The carved teeth were then exhibited in the bric-a-brac, drygoods, and whiskey shops in New Bedford, where they were frequently exchanged for a mere trifle. This lasted until the whaling industry was destroyed by the introduction of petroleum. If the latter had not been discovered, whales would have become extinct. Ivory is not well adapted for use in making artificial teeth and has been but very rarely employed in this way, although an ivory tooth has been unearthed on a spot on Manhattan Island in the neighbourhood of 190th Street.

The Bayerischer Landesgewerbeanstalt in Nuremberg possesses many of the smaller ivory carvings, some of these being modern while others are the work of the seventeenth and eighteenth centuries. Although by far the greater part of these objects are of elephant ivory, there is one interesting bit carved of walrus ivory. This is a miniature reproduction of the monument of Peter the Great on the Neva at Petrograd.

A weird and unpleasant rumour is reported on the authority of a Hamburg importer of bone and ivory. This is that human bones are imported from the Levant for industrial use. These were said to be more desirable than others for artistic work, because they contained less phosphoric acid. The writer who records this report declares that he could not find any confirmatory evidence, although he made diligent efforts to secure it.*

A long string of fifteen interesting objects, rather ghastly in their associations, but with a history, are to be seen in the Oakland Public Museum, Oakland, California. These are idols carved out of human bones with great skill and

*Somborn, "Die Elfenbein-und Beinschnitzerei," Heidelberg, 1899, p. 31; note.



SCRIMSHAW WORK DONE BY AMERICAN SAILORS ABOUT 1864

- I. ETCHINGS ON WALRUS-TUSK. $\frac{2}{3}$ LENGTH
II. DECORATION ON BONE OF A WHALE. $\frac{1}{3}$ LENGTH

COLLECTION OF THE AUTHOR



SCRIMSHAW WORK OF AMERICAN SAILOR

A PAIR OF WALDEN KNIVES WITH PATRIOTIC AND SENTIMENTAL DEORATIONS
COLLECTION OF A. N. BRADBURY, 1899

wonderful ingenuity by natives of St. Christian Island, one of the Marquesas group. They were used as adornments of a native drum, and had the repute of being sacred, so that only privileged persons were permitted to touch them. These particular specimens were secured from the native chief Mateo Annatatea. This museum also has a drill-bow made of walrus ivory which had been used to twirl the drill of a primitive fire-making outfit. A leather strap was wrapped once around the shaft and the ends of the leather were then fastened in the holes at the extremities of the bow. Its movement caused the shaft to revolve rapidly in the socket of the bed piece. This was made by Alaskan Indians. An ivory fan-handle in the Museum, from the Marquesas Islands, once belonged to the collection of Dr. John Rabe, as did also the idol ornaments made from human bone.*

The scrimshaw work was frequently accomplished by obtaining a picture from a print, or otherwise from a photograph, pasting it on the walrus tooth, walrus tusk, or walrus bone, and with a sharp point piercing the paper, thus producing the principal outlines of the subject, then the paper was soaked off and the final details were finished with the same knife or pointed tool used in fixing the outlines.

One of the most interesting objects of scrimshaw work is a mammoth tusk, 12 ft. along the curve and weighing 75 lbs., obtained in Alaska by an American sailor, who had resided there for some years, and who carefully removed the bark of the tusk and then produced 57 views of Alaskan scenery with remarkable fidelity, decorating the entire tusk from the tip to within six inches of the lower end. As this was work executed some fifty or more years ago, the tusk has a great value as picturing scenes in many places in Alaska at that time. It is now in the collection of the Golden Gate Park Museum, San Francisco, California.

*Communicated by Mrs. D. W. de Vere, Acting Curator of the Museum.

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More recently the Japanese have taken up the ivory bead industry, have introduced the use of machinery, and are therefore enabled to make beads for a very small part of what the cost would be when manufactured by the Eskimos. These machine-made beads are more regular, but less artistic, than those made by hand, nevertheless they find a ready sale among the tourists. The Eskimos of the Alaskan Coast have worked the modern walrus ivory, as well as the water-worn walrus ivory cast up on beaches, into beads that are fairly round and only slightly irregular; occasionally they have a long, oval-shaped bead for the centre of a necklace. These beads are sold from Juneau to Nome, a distance of 1,500 miles. Their colour ranges from a dull bronze almost into an olive green.

The Jonathan Bourne Memorial Whaling Museum, situated adjacent to and connected with the Historical Society of New Bedford, was founded by Miss E. H. Bourne of New Bedford, Massachusetts, and New York, daughter of the late Jonathan Bourne. Of this museum it can be said that it contains everything relating to whaling, including a half-size whaler ship with its full complement of men. Here may be seen as well carved teeth, carved whalebone, and other objects of corresponding nature.

The "Tuskers of the Deep" are principally represented by the narwhal and the walrus. A typical example of the double-tusked narwhal is in the British Museum Natural History collections. It is noteworthy that in this specimen, acquired in 1885, the spiral twist has the same direction in both tusks, in marked contrast to those of spiral-horned animals, where there is a right-hand spiral on one horn and a left-hand spiral on the other one.*

* "Guide to the Whales, Porpoises, and Dolphins (order Cetacea), exhibited in the Department of Zoölogy, British Museum (Natural History)", London, 1909, pp. 33, figured on plate opp. p. 28.

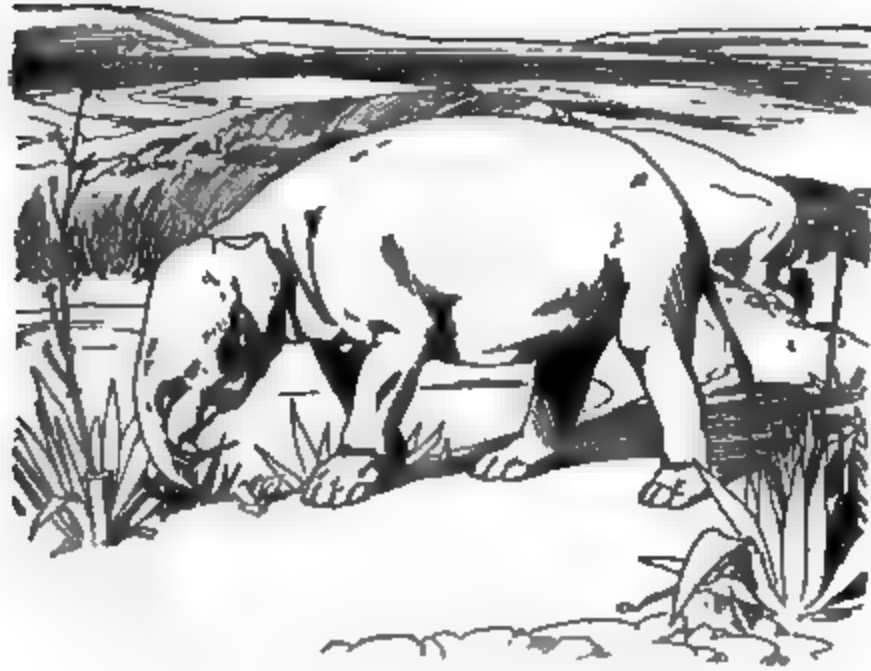
CHAPTER X

ELEPHANTS, EVOLUTION OF; ALSO MASTODON, MAMMOTH, ETC.

THE first step in the evolution of the elephant is recorded in the fossil remains of the *Mæriotherium*, which have been found in the Eocene and early Oligocene beds of the Fayûm, Egypt, and have quite recently been reported from the Oligocene of India.* The remains of this tapir-like animal clearly show an early stage of the development of the trunk, in the unmistakable indication of a prehensile upper lip, and also the beginnings of the tusks denoted by the sharply projecting incisors of the upper jaw. The *Mæriotherium* was only about three and a half feet high, and the original type is still found in the Lower Oligocene, along with the *Palæomastodons*, representing the gradual evolution of certain *Mæriotheria* into a type more closely resembling the elephant. The Oligocene strata have not as yet offered any remains illustrating the further development of the elephant, except in India, where fragmentary remains of a more advanced stage, *Hemimastodon*, have lately been found.† Its earliest migration into Europe must have been in the early Miocene age, and in the Middle Miocene the elephant had already penetrated into North America.

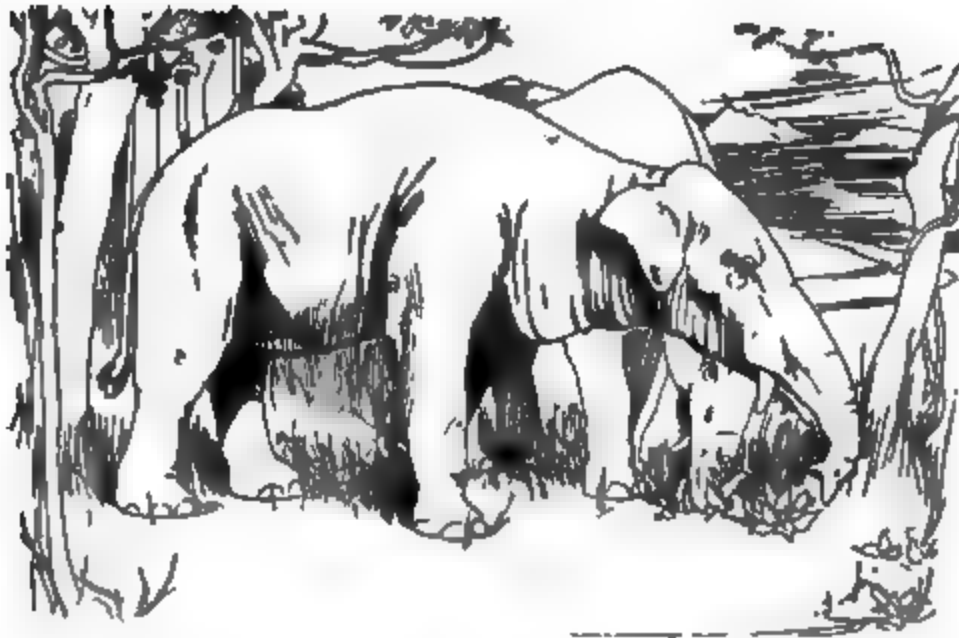
*Dr. W. D. Matthew, Curator of the American Museum of Natural History, New York City, kindly offered many suggestions and added materially to this chapter.

†Guy E. Pilgrim, 1912, "The Vertebrate Fauna of the Gaj Series in the Bugti Hills and the Punjab," *Palæontologia Indica*, New Series, Vol. IV, Memoir No 2, pp. 1-83, plates i-xxx.



RESTORATION of *Maritherium*, the earliest fossil form leading up to the elephant.

—From "A Guide to the Elephants (recent and fossil) in the British Museum (Natural History Division)."



RESTORATION of *Palaeomastodon*, one of the stages in the development of the elephant.

—From "A Guide to the Elephants (recent and fossil) in the British Museum (Natural History Division)."

10. *Elephas columbi*, short-jawed mammoth from Franklin County. Pleistocene, Nebraska.



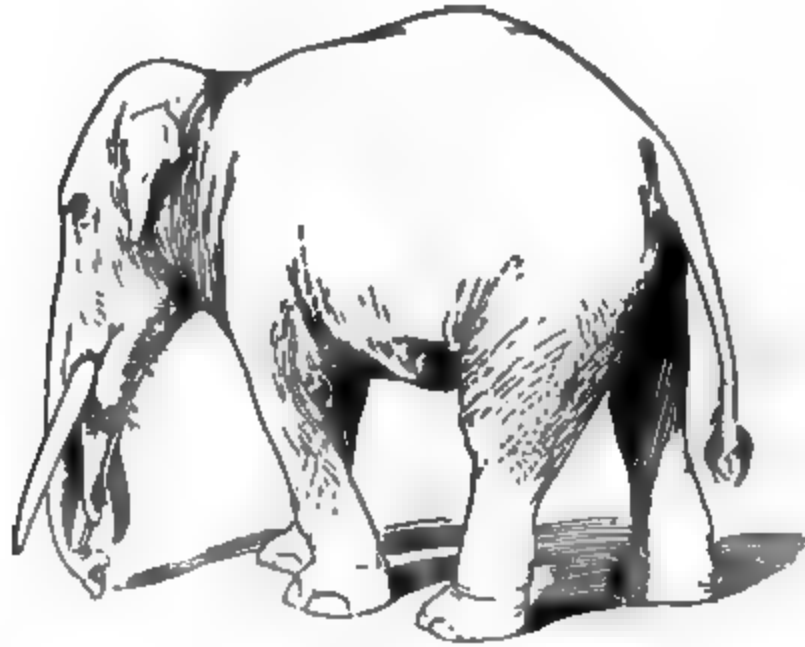
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EVOLUTION OF ELEPHANTS 325

It was, however, in the Pleistocene age that the elephant was most widely distributed over the earth's surface, and the largest number of species are shown in this period. With the exception of Australia, elephants existed in every part of the world during the greater part of the Pleistocene age; its close, however, was marked by a notable decrease in their number, culminating in the reduction of the many types to the Indian and African elephants as we now have them.*



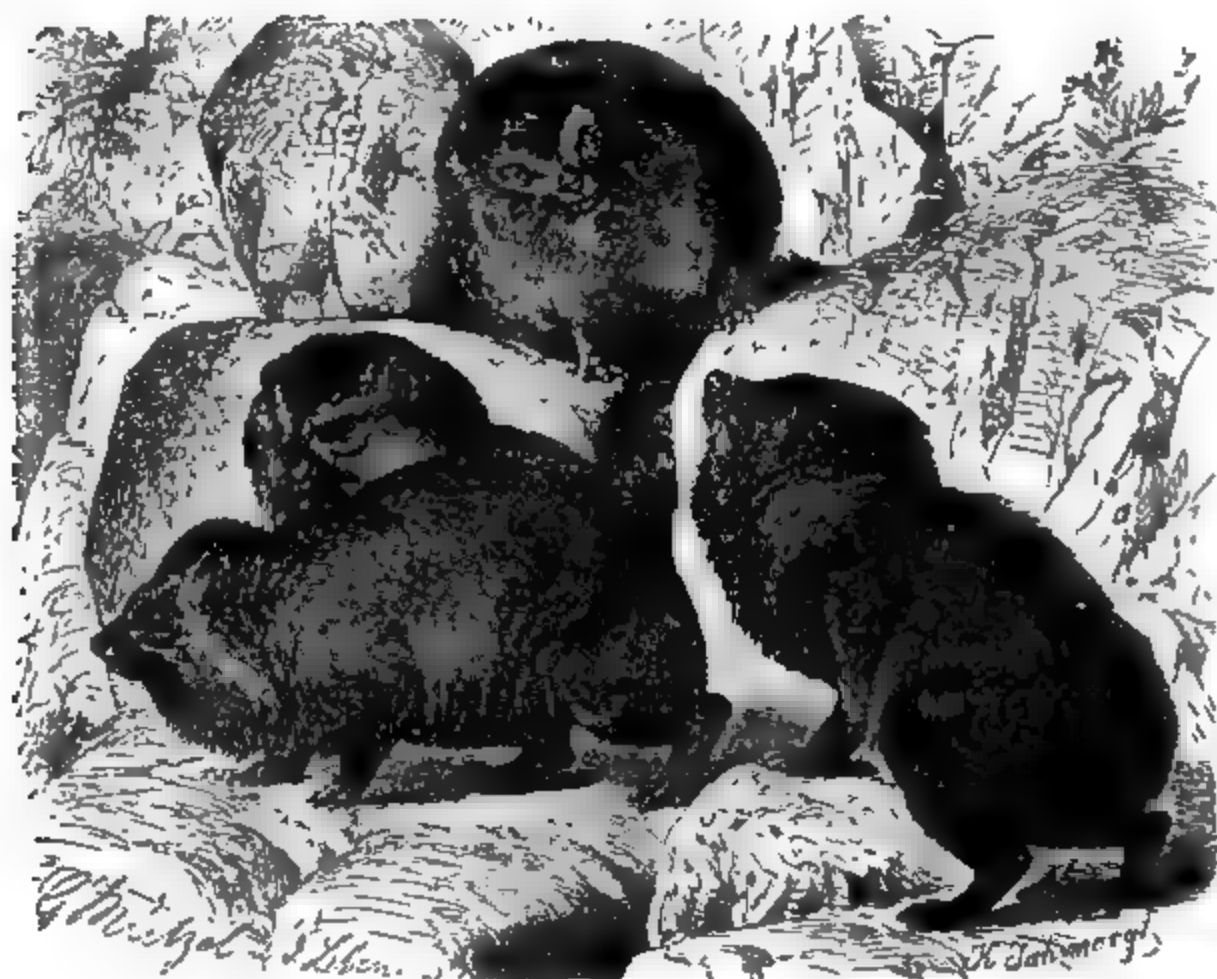
RESTORATION of *Tetrabelodon angustidens*
—From "A Guide to the Elephants (recent and fossil)
in the British Museum (Natural History Division)."

A close morphological relationship with the elephant, in the earliest stages of its development, has been claimed for the Sirenia, or sea-cows, the American representative being the Florida manatee (*Manatus americanus*), in spite of their apparent unlikeness to any of the Proboscidea. In the Eocene of the Fayûm in Egypt, where remains

*Richard S. Lull, "The Evolution of the Elephant," Peabody Museum of Natural History, Guide No. 2. Reprinted from *Amer. Jour. Sc.*, Vol. XXV, March, 1908. The Proboscideans of South America occur in the Pampean formation which is regarded as Pleistocene by Professor Scott and other authorities. See W. B. Scott, 1913, "History of the Land Mammals of the Western Hemisphere," p. 133. W. D. Matthew, 1915, *Trans. N. Y. Acad. Sci.*, Vol. XXIV, pp. 195-200.

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of *Meritherium* have been dug up, Sirenia with true hind limbs have been found, the rudimentary hip bones of the present manatee, without possible function, being evidently vestigial. Structural similarities have also been noted by anatomists between the elephants and the *Hyrax*, the typical genus of the family Hyracidae, our conies or damans, small rabbit-like animals not exceeding 18 in. in length,



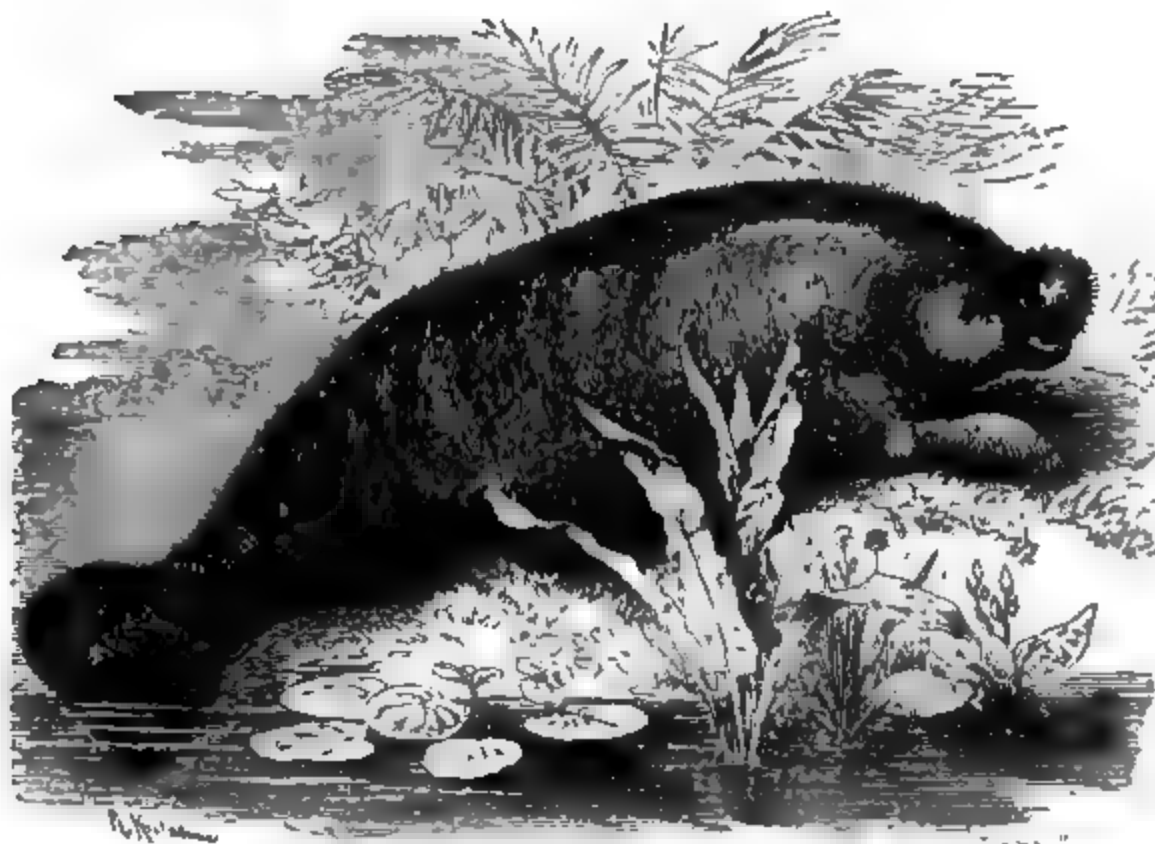
CONIES (*Hyrax abyssinicus*); after Brehm.

—From Richard S. Lull, "The Evolution of the Elephant."

tailless, with short ears and hoof-like nails in place of the claws which would be expected from the general conformation. Excepting the Syrian conies, of which the Book of Proverbs (xxx. 26) says that though "a feeble folk, yet make they their houses in the rock," these animals are confined to Africa, and Egyptian deposits, in which remains of the earlier ancestors of the elephant occur, contain also bones

of a *Hyrax*, much larger than the conies of our day and more nearly related to the early forms of Proboscidea.*

The chain of development of the prehistoric-elephant species of the Old World has long been the subject of discussion among palæontologists.† One point, however, seems to be regarded as fairly well established, namely, that the living African species does not appear to be directly related



THE MANATEE, *Manatus australis*, after Brehm.

—From Richard S. Lull, "Evolution of the Elephant."

to any of those of which fossil remains have been found, and that the question regarding its origin is as yet unsolved.

With the Indian elephant and the extinct species of European elephants, the case is different, and it is possible to gain a general idea at least of the different links in the

*Richard S. Lull, op. cit., pp. 1, 2, 9, Figs. 1 and 2.

†For a satisfactory statement of the results and theories connected with the subject, see W. Soergel, "Die Stammesgeschichte des Elefanten," in *Centralblatt für Mineralogie, Geologie, und Paläontologie*, Nos. 6, 7, 8, and 9, March 15, April 1, April 15, and May 1, 1915.

chain of development from the earliest elephant species clearly defined in the remains, the *Elephas planifrons*, a type prevailing in the Upper Pliocene. From this earliest variety—the existence of a still earlier *Elephas priscus* has not been clearly established—there were evolved, during the Upper Pliocene, two Indian forms, the *Elephas hysudricus* — in the east and the *Elephas meridionalis* in the west. It is — from this latter species, or from some of the intermediate — forms between it and *E. planifrons* that, in the Pleistocene — period, the European species are derived. As a result of — the long-continued migrations and of the consequent changes — brought about in a long lapse of time by varied climatic — and geographic conditions, two main types were evolved in — Europe, one inhabiting principally the woods and forests, — the *Elephas antiquus*, and the other the plains and open — valleys, the *Elephas primigenius*.

The origin of the dwarf-elephant species, of which fossil remains have been found in some Mediterranean islands, is believed by Soergel to have resulted from a progressive degeneration of the full-grown type, owing to the imperfect environment provided by the restricted island territory. This, however, scarcely seems to account for the living dwarf elephants of the Congo region in Africa. Thus, in the case of the extinct *Elephas melitensis*, we would have a degenerated *E. antiquus*, while the *Elephas cypriotis*, of the Island of Cyprus, presents certain features indicating that it was derived from an earlier form of the European elephant, one more closely allied to *E. meridionalis*.

In the Pleistocene age the species *E. hysudricus* gave rise in process of time to the later species *Elephas indicus*, the immediate ancestor of the Indian elephant of our day.

That *Elephas planifrons* cannot be regarded as the immediate predecessor of the species *Elephas meridionalis* and *Elephas antiquus* is held to be clearly shown by the

comparative homogeneity of the skull type of the first-named species and especially by the lack of variation in the molars, this homogeneity precluding the idea that two differentiated types, such as *E. meridionalis* and *E. antiquus*, could be evolved without one or more intermediate stages of development. This confirms the view that the *antiquus* type and the *Elephas primigenius* are derivable from *E. meridionalis* as a common ancestor.* Of the period in which the progressive differentiation of *Elephas meridionalis*, or rather at least of some form of this species, into the two species *E. antiquus* and *E. primigenius* took place, Soergel writes:†

“However far back in the Upper Pliocene we may place the differentiation of the two main diluvial species, there can be no doubt of the fact that the divergence of both lines of descent first appears strongly marked at the end of the Pliocene age, and that it is only with the beginning of the Glacial Period that these two types, long closely associated through all their variations, become sharply defined one from the other.”

Each of the elephant's molars displays a number of transverse ridges of dentine. These are bounded by enamel and are united by cement. The number of these transverse plates varies markedly in different specimens and different species and varieties, ranging all the way from four to twenty-seven.‡ The marked difference apparent in the ridges on the molars of the African and Indian elephants, respectively, has been explained as due to the fact that the food of the former is usually of a softer kind and

*W. Soergel, “Die Stammesgeschichte der Elephanten”; Centralblatt für Mineralogie, Geologie, und Paläontologie, No. 8, April 15, Stuttgart, 1915.

†Loc. cit., p. 248.

‡Arthur Hopewell-Smith, “An Introduction to Dental Anatomy and Physiology, Descriptive and Applied,” Philadelphia and New York, 1913, pp. 332, 333; see p. 91, Fig. 61, for coronal aspects of molars from the African and Indian elephant.

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more easily masticated than that on which the Indian elephants nourish themselves. This has resulted in the development of molars on the surface of which the plates appear in perhaps only six or seven lozenge-shaped ridges.

The development of elephants and mastodons and the area over which the animals roamed in the later geological periods can be presented with a fair degree of accuracy by utilizing the evidence provided by fossil remains in various parts of the world. The following views are offered by one of the most competent investigators in this field.* The geological data from the later Tertiary and the Quaternary periods clearly indicate Asia as the region whence the various species spread themselves over the world. The leading characteristics of the northern species are their smaller size, a more marked specialization of the teeth, length of tusks, and a shortening of the skull accompanied by a proportionate lengthening of the trunk. Primitive types of the mastodon have been found in the Oligocene of India, the Lower Miocene of Europe, and the Middle Miocene of North America, the Pliocene and Pleistocene of India offering the best view of the intermediate stages of the progressive developments of mammoth and elephant from the earlier forms, the palæontological material from North America not giving as exact a series. While mammoths and elephants were very widely distributed in Pleistocene times, there is but scant evidence that they ever extended to South America, although a certain quantity of mastodon remains have been found there. That the earliest forms of Proboscidea have been found in Egypt is not regarded by Doctor Matthew as proof of the Ethiopic origin of these primal forms, as the Oligocene of northern Egypt, whence this palæontological material has been derived,

*W. D. Matthew, "Climate and Evolution," *Annals of the New York Academy of Sciences*, Vol. XXIV, pp. 171-318; New York, February 18, 1915. See pp. 254, 255.

belongs to the Mediterranean sub-region of Holarctica, not to the region of Ethiopia. The centre of dispersion may have been southern Asiatic in the later Tertiary, this centre moving northward after the spread of the elephant into northeast Africa. The following table is given by Dr. Matthew to illustrate the distribution of the Proboscidea.*

PERIOD	NETROPICAL	NECARTIC	PALÆARCTIC	ETHIOPIAN	ORIENTAL
Recent	None	None	None	Loxodon	Elephas
Pleistocene	Dibelodon	Elephas Mastodon	Elephas Mastodon	Elephas Trilophodon	?
Pliocene	None	Dibelodon	Elephas Mastodon Tetralophodon	(No record)	Stegodon
Miocene	None	Trilophodon	Trilophodon Dinotherium	Dinotherium	Tetralophodon Trilophodon Dinotherium
Oligocene	None	None	None	Palaomastodon Moeritherium ?	Hemimastodon Dinotherium Moeritherium
Eocene	None	None	None	Moeritherium	(No record)

The duration of the "Age of Mammals" has been estimated by various geologists as being from 3,000,000 to 6,380,000 years and even longer. Wallace's estimate of 1881 was 4,200,000 years. This covers the Tertiary (Eocene, Oligocene, Miocene, Pliocene) and the Quaternary (Pleistocene, Recent) periods; 4,000,000 years are assigned to the former and 200,000 years to the Quaternary. This last period, however, is estimated by Penck to cover from 500,000 to 1,000,000 years. Of the prehistoric Magdalenian period, to which is assigned the remarkable etching of a mammoth on a piece of ivory, Penck estimates that it lasted approximately from 22,000 to 14,000 B.C.†

*W. D. Matthew, "Climate and Evolution," Annals of the New York Academy of Sciences, Vol. XXIV, pp. 171-318; New York, February 18, 1915. See p. 255.

†Henry Fairfield Osborn, "The Age of Mammals in Europe, Asia, and North America," New York, 1910, pp. 63, 385.

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The three types which existed at the same time with man were the mastodon, *Mammot americanum*, in North America,* also found in Russia, the straight-tusked elephant, *Elephas antiquus*, in Europe and southern Asia, and the hairy mammoth, *Elephas primigenius*, in Europe and in northern Asia and North America. As is well known, some remarkably well-preserved specimens of the last-named type have been found in Siberia, one of the most impressive being that found in 1900, on the Beresovka, Siberia, eight hundred miles west of Bering Strait, and sixty miles north of the boundary of the Arctic Circle. The remains show unmistakable evidences of a violent death, probably resulting from a fall into a hidden ice crevasse. In the animal's mouth could still be seen pieces of grass partly masticated and unswallowed, and a fractured hip indicated a disabling injury from the fall. The frantic efforts the mammoth must have made to extricate itself from its icy prison are testified to by a mass of clotted blood in its chest resulting from the bursting of a blood vessel. This mammoth's hide was covered with an under coat of woolly, yellowish-brown hair and an outer bristly coat, shading from fawn colour to a dark brown or black. On the chin and the breast this hair reached a length of at least half a yard. The remains have been set up in the Petrograd Museum of Natural History as nearly as possible in the same position in which they were found, the skeleton being placed alongside in a walking posture.†

This Beresovka mammoth, as it is now commonly called, was first reported by a Lamut named Tarabykni, who was out

*Mastodons of peculiar type also existed in South America, probably contemporary with primitive man; the true elephants did not reach that continent. See W. B. Scott, 1913, "History of the Land Mammals of the Western Hemisphere," p. 436.

†Richard S. Lull, Ph. D., "The Evolution of the Elephant," Annual Report (1908) of the Smithsonian Institution, pp. 652, 653. The plate in the present work is from a photograph sent by F. Loewinson-Lessing, of the Imperial Museum of Natural History, Petrograd.

IMPERIAL MAMMOTH PLEISTOCENE, TEXAS	COLUMBIAN MAMMOTH PLEISTOCENE, INDIANA	HAIRY MAMMOTH PLEISTOCENE, ALASKA	INDIAN ELEPHANT	AFRICAN ELEPHANT
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MORRITHERIUM UPPER EOCENE, EGYPT	PALÆOMASTODON UPPER EOCENE, EGYPT	DINOTHERIUM UPPER MIOCENE, FRANCE	TRILOPHODON MIOCENE, MONTANA	MASTODON PLEISTOCENE (?) , NEW YORK
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GRINDING TEETH OF MASTODONS, MAMMOTHS AND MODERN ELEPHANTS

WEIGHT OF PROBOSCIDEAN TEETH					
Imperial Mammoth	17 lbs., 10 oz.	Indian Elephant	5 lbs. 14 oz.	Trilophodon	4 lbs. 7 oz.
"	10 " 14½ "	African "	3 " 12 "	Dinotherium	1 " 7½ "
"	7 " 13½ "	Mastodon	5 " 1 "	Morritherium (plaster cast) estimated	3 "

The original Morritherium tooth is in a skull and could not be removed for weighing



THE BERESOVKA
FOUND EMBEDDED IN THE ICE NEAR THE BERESOVKA RIVER IN NORTHWESTERN SIBERIA.
FRANTIC EFFORTS TO ESCAPE FROM THE CREVASSE INTO WHICH IT HAD FALLEN.



RIMIGENIUS)
THE EXACT POSITION OF THE ELEPHANT WHEN DEATH OVERTOOK IT IN SPITE OF ITS
IN THE IMPERIAL MUSEUM OF NATURAL HISTORY, PETROGRAD

on a hunting expedition in the northeastern part of Siberia, in August, 1900. On the steep banks of the Beresovka River, an affluent of the Kolyma, he came across a large mammoth tusk weighing 166 pounds, and soon after observed in the same neighbourhood the well-preserved head of a mammoth still retaining one of the tusks; the large tusk first found did not, however, belong to these remains. Some other natives declared that they had already seen this head exposed a year earlier, and that the skin was even then partly destroyed, the trunk being completely absent. On the left bank of the Beresovka, where this find was made, the uppermost layer, from 30 cm. to 52 cm. thick, consists of moss-covered earth, then comes an earth mass from 2 to 4 metres in thickness, and containing fragments of stone and wood as well as clumps of ice. Beneath this is a horizontal, perpendicular ice wall. The mammoth remains were embedded in the earthy layer directly above the ice. An expedition under the direction of the late Prof. O. F. Herz was sent out in 1901 to unearth the remains and to transport them to Petrograd. This task was successfully accomplished, the fleshy parts being packed in sacks filled with water which quickly froze, thus preserving the flesh from decomposition during the transportation on sledges. Between the teeth were remains of grasses, and the stomach still contained a considerable mass of food. This mammoth was of the male sex and had not yet attained its full growth; its length was about 3 metres and its height about 2 metres, or $6\frac{1}{2}$ ft. The single tusk remaining was 1.75 metres long and weighed about 63 pounds. An exceptionally interesting circumstance is that the results of an analysis of clotted blood found between the diaphragm and the stomach established the relationship of this Siberian mammoth with the Indian elephant species. Nevertheless the woolly hairy covering, 20 to 30 centimetres long, clearly

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showed that in its present form it was emphatically a northern animal. This was also apparent from the thick layer of fat beneath the skin. Among the grasses found in the elephant's mouth were the following species: *Thymus serpyllum*, *Ranunculus acer borealis*, and *Papaver alpinum*, the Alpine poppy, a relic of the Glacial Epoch. All the indications point to the conclusion that the mammoth inhabited northern Siberia at a time when the conditions differed but little from those of the present day.*

The range of the various species of mammoth has been approximately determined by the ancient remains discovered. The Siberian mammoth was present in central Europe, Alaska, and Canada, as well as in Siberia, the southern limit of its range extending into the northern part of the United States; the Columbian mammoth roamed over the territory now constituting the United States, and beyond its southern border, while the Imperial mammoth was an inhabitant of the southwestern part of this territory and also of Mexico.

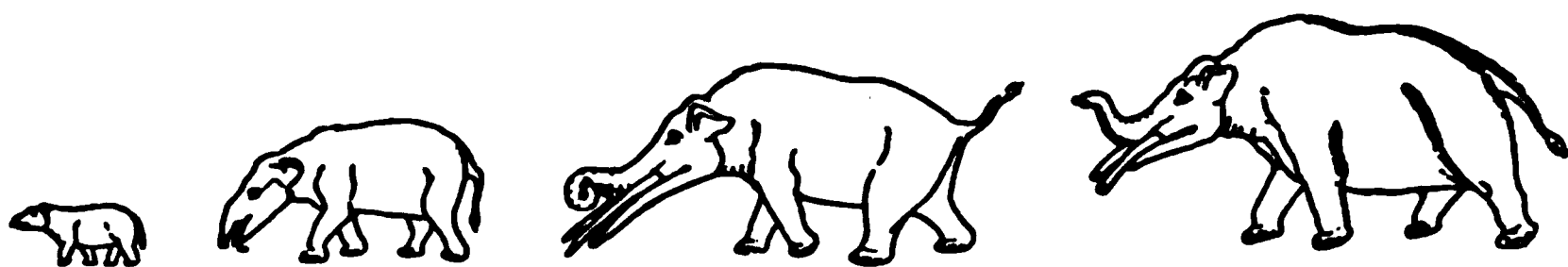
The evolution of the elephant, though there are some gaps in the line of descent, may be said to begin as has been noted, with the Eocene and Oligocene *Mærittherium*, then comes the *Palæomastodon* of the Oligocene period, with a very short trunk, longer tusks, and an anatomical structure approaching that characteristic of the mammoth and the elephant. The next links in the chain are the Miocene *Trilophodon* and *Tetralophodon*, a specimen of the former from Texas shows well-developed functional lower tusks, the upper tusks being relatively short; with a longitudinal strip of enamel on the outer side.† In size the *Tri-*

*Dr. Hugo Obermaier, "Der Mensch der Vorzeit," Allgemeine Verlags-Gesellschaft Berlin, München, Wien [1912], p. 79 sqq.

†The tusks are sometimes much longer, as in a fine skeleton in the Paris Museum, but they are straight instead of curving upward.



EVOLUTIONARY CHANGES OF PROBOSCIDEA. a. *Elephas columbi*. b. *Mammut americanum*. c. *Tetralodon angustidens*. d. *Palaeomastodon*. e. *Meritherium*.
 Courtesy of Prof. Richard S. Lull—From his "The Evolution of the Elephant."



PROBOSCIDEANS, approximately to scale. a. *Mæriotherium*, Eocene, Egypt. b. *Palæomastodon*, Miocene, Egypt. c. *Tetrabelodon lulli*, Pliocene, Nebraska. d. *Eubelodon morrilli*, Pliocene, Nebraska. a and b modified after Osborn.

lophodon might be compared with the rhinoceros, although its head was larger. This brings us to the *Stegomastodon* of the Pliocene or Pleistocene age, which shows a still nearer approach to mastodon and mammoth. In a Pliocene specimen from Texas the upper tusks, although not long, have an upward curve as in the mammoth, and have lost the enamel band characteristic of the older proboscideans.*

In India the Pleistocene river deposits, as well as the Siwalik formation (Lower Pliocene) preserve fossil elephant remains, mostly of a type nearly allied to the Indian elephant of our own day. Some varieties, however, appear to be representative of intermediate stages of development between the Indian and the African elephants; these are *Elephas planifrons* and *Elephas hysudricus*. In these latter, indeed, we are said to have the earliest examples of the true elephant that have been anywhere found. These Indian remains cover many other stages in the evolution of the elephant, and exhibit in a very clear manner the develop-

*Communication by Dr. W. D. Matthew, Curator of the Museum of Natural History, New York. See also O. P. Hay, "Pleistocene Mammals of Iowa," in Ann. Report Iowa Geol. Survey, Vol. xxiii, p. 373, 1915.



THE LAST LOWER MOLARS OF PROBOSCIDEANS, showing progressive changes. a. *Mæriotherium*. b. *Palæomastodon*. c. *Tetrabelodon*. d. *Mastodon americanus*.



Continuation. e. *Mastodon americanus*, Pleistocene, Nebraska. f. *Elephas hayi* Pleistocene, Nebraska. g. *Elephas columbi*, Pleistocene, Nebraska. e and g modified after Osborn.

ment of the molar as shown in living elephants. This, proceeding from the nipple tooth of the mastodon, its thick cross-ridges traversed by wide depressions, has passed through the stage exhibited by the teeth of *Stegodon*, having an increased number of ridges, while a good part of the intervening spaces is now partly filled up with dental cement. This change is accentuated in the true elephant molar with still deeper ridges, between which the much greater amount of cement almost serves to obliterate the intervals.*

The German zoölogist, Dr. W. Soergel, finds that the form of the skull and tusks of the American *Elephas imperator* correspond fully with those of the Old World species, *meridionalis*, *trogontherii*, and *primigenius*, the great size of the *imperator* also indicating its formal relationship to these. The molars of *imperator* represent essentially the stage of development shown in *Elephas trogontherii meri-*

*See A. Smith Woodward, "A Guide to the Fossil Mammals and Birds in the Department of Geology and Palaeontology in the British Museum," London, 9th ed., 1909, pp. 55-60.



Continuation. e. *Stegodon*. f. *Elephas hayi*. g. *Elephas imperator*.

Recent

Pleistocene

Upper Pliocene

ELEPHAS
(short chin)



Lower Pliocene

Upper Miocene

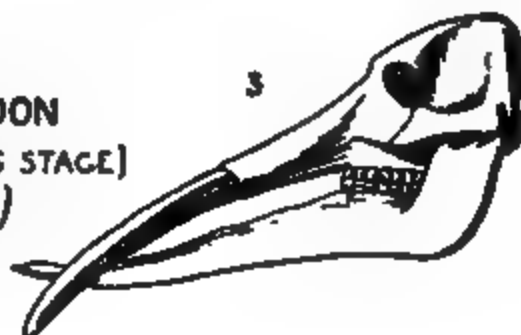
TETRABELODON
[LONGIROSTRIS STAGE]
(shortening chin)



Middle Miocene

Lower Miocene

TETRABELODON
[ANGUSTIDENS STAGE]
(long chin)



Upper Oligocene

*Migration from Africa
into Europe - Asia*

?

Lower Oligocene?

Upper Eocene

Middle Eocene

Lower Eocene

PALAEOMASTODON
(lengthening chin)

MOERITHERIUM
(short chin)



?

ANCESTRY OF ELEPHANTS. Progressive stages of development.
—From "A Guide to the Elephants (recent and fossil) in the British
Museum (Natural History Division)," Dr. A. Smith Woodward.

dionalis. The most striking characteristic of the American elephant, especially of the *imperator* type, according to Dr. Soergel, is its race purity as compared with the more variable forms of the European species. He considers *Elephas columbi* to be the direct descendant of *Elephas imperator*; whether the *primigenius* form in America was an autochthonous development from earlier forms, or was directly derived, through migration from Asia, remains doubtful.*

The early discoverers of mammoth bones in Europe were confident that these were the remains of men of gigantic stature. They were, perhaps, mindful of the Scriptural saying that "there were giants in those days."

The choice of the "Wild Man" or the "Giant of Reyden" as bearer of the city coat-of-arms of Lucerne, Switzerland, is said to have been due to the reconstruction—or rather construction—of a putative giant figure out of mammoth bones found near the monastery of Reyden, Canton Lucerne, in 1577. Even the famous physician of Basel, Felix Plater, gave his judgment in favour of the theory that they were the bones of a giant when he was shown them in 1584, and in pursuance of this view he induced the painter, H. Bock, of Basel, to make a sketch of a gigantic human skeleton built up out of these mammoth remains and which must have measured over 16 ft. in height. It has been stated that this sketch still exists in the Jesuit monastery of Lucerne.†

About the beginning of the seventeenth century a quantity of bones of enormous size were dug up on the banks of the river Isère, at a spot where Hannibal halted for a while on his expedition from Spain to Italy. Many of the learned of the time asserted that these bones must be those of the

*W. Soergel, "Die Stammesgeschichte der Elephanten," in *Centralblatt für Mineralogie, Geologie, und Paläontologie*, 1915, No. 9, May 1, pp. 278-284.

†Johannes Felix, "Das Mammuth von Borna," Leipzig, 1912, p. 4.

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Cimbrian chief, Teutobocchus, whose extraordinary height is recorded by Latin authors, although they seem to have failed to note the slight objection that Teutobocchus, though defeated at this place, survived his defeat and was forced to walk in the triumphal procession of the victor. It has been conjectured, not without probability, that these were the bones of one of Hannibal's elephants, many of which died on the way to Italy.*

Many important facts of the primitive history of peoples have been learned through philology, the original meaning of the roots whence names of animal or plant species have been derived usually showing the impression made by the plant or animal form upon those who first became acquainted with it. More especially is this true in a language of such peculiar and almost transparent structure as Chinese. Here the character used for elephant signifies also form and image, and this is explained by the tradition that in ancient days the bones of a dead elephant were found and were put together to look like the living animal. The character itself in its earliest form represented schematically the four legs, the ears, the trunk, and the tusks of an elephant. The name given to a large district in the northern part of Kwangsi province perpetuates the memory of the finding of elephants there in the period of the Han Dynasty, founded in 206 B. C.† A Chinese proverb expressive of inordinate greed is "A snake would fain swallow an elephant." The use of ivory adornment for the gates of the Imperial Palace is testified to by the fact that "ivory gate" is a synonym of palace.

"Buried ivory," or fossil ivory, appears to have been known at an early period to the Chinese. They accounted

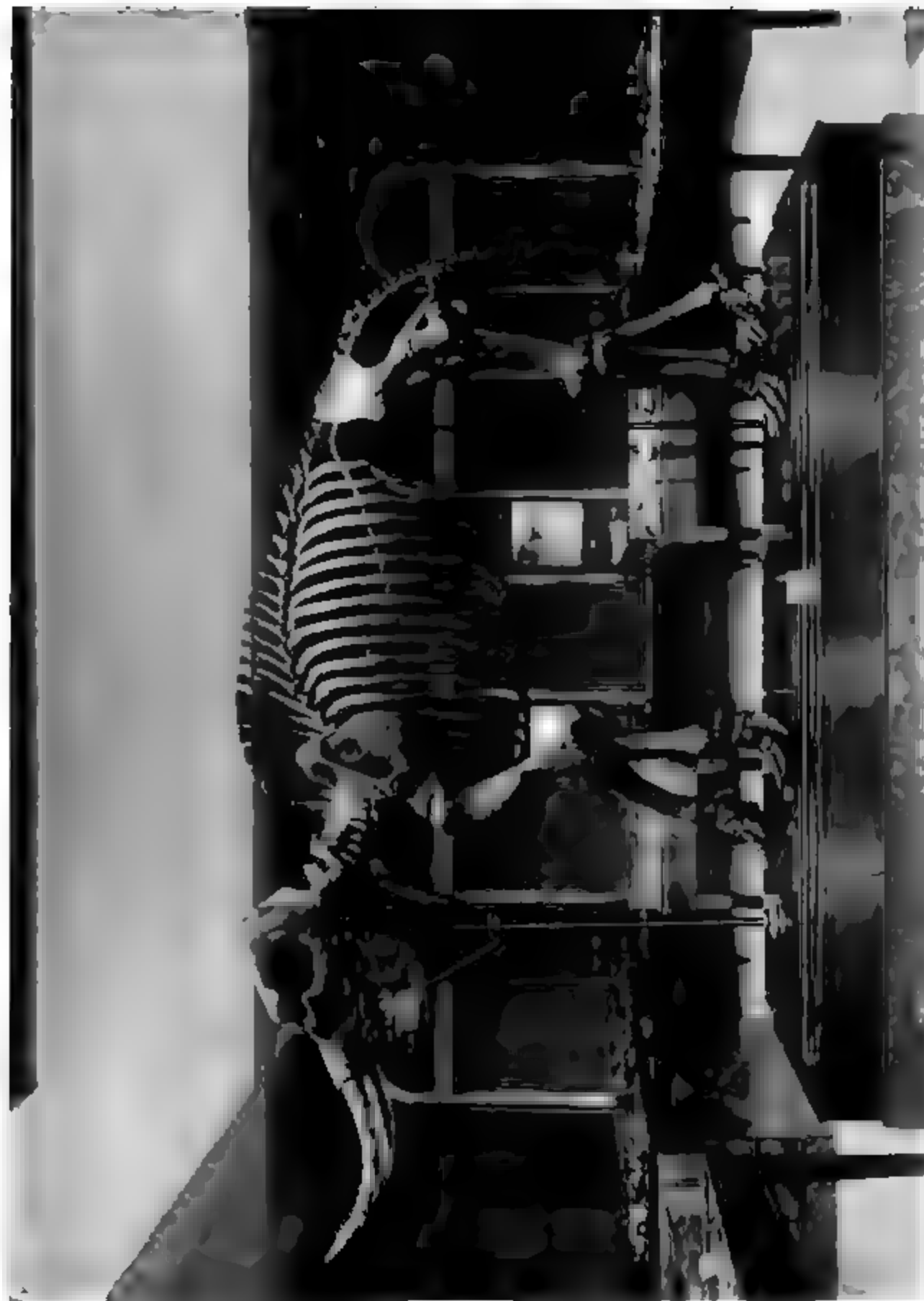
*John Wither, "The course of Hannibal over the Alps ascertained," London, 1794, Vol. I, pp. 35, 36.

†S. Wells Williams, "Dictionary of the Chinese Language," Shanghai, 1903, p. 792.



ASIATIC ELEPHANT
"SAMSON"

AFRICAN EL
"JUMB"



MAMMUT AMERICANUM

MUSEUM OF HISTORY, SCIENCE, AND ART, LOS ANGELES, CALIFORNIA. PUBLISHED BY COURTESY OF DIRECTOR FRANK S. BAGGETT

for it as being the remains of a fabulous creature denominated *thien-shu*, or "the mouse that hides." This "mouse," however, is said to have been as large as an elephant, with bones as white as ivory, and *cold*, but pure and wholesome flesh; an allusion, it is believed, to the frozen remains of mammoths. The "claw of a griffin," said to have been given by the Khalif Haroun al Rashid to Charlemagne, was probably a horn of the woolly Siberian rhinoceros. This was, however, an isolated instance, although possibly some of the unicorn's horns listed in old inventories may have been of a similar kind, but the first certain notice we have of the importation of Siberian fossil ivory into Western Europe refers to some brought to London in 1611, by Josias Logan, who bought it from the Samoyedes of the Pechora district.*

Certain data regarding the reported discovery of giants' bones were published in the "Mémoires" of the French Academy of Sciences in 1727 by Sir Hans Sloane, whose collection formed the foundation of the British Museum.† An early instance is given by Pliny,‡ who tells of an immense skeleton, 46 cubits high, which was found in a cavern of a Cretan mountain that had been rent asunder by an earthquake. An even more marvellous tale, told in late medieval times, recounted the finding in Rome of the skeleton of Pallas, which was higher than the city walls. A still stranger instance is given by Simon Majolus** who quotes from Fulgosus, an earlier writer, that the bones of one of the olden giants were in England, in 1171, still lying in their proper order in the alluvium of a river; this skeleton measured

*R. Lydekker, "Mammoth Ivory," see Smithsonian Annual Report for 1899, pp. 361-366, and Sc. Amer. Suppl., 1928, July 11, 1899.

†"Mémoire sur les dents et autres ossements de l'éléphant trouvés dans la terre"; in Mémoires de l'Académie Royale des Sciences, 1727; Paris, 1729, pp. 305 sqq.

‡"Naturalis Historia," Lib. VII, cap. 16.

**Dierum concularium, colloq. 2, p. 36.

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50 ft. in length. These and many other such instances are thought by Sloane to have referred to the finding of bones of extinct European elephants. Of course no single elephant skeleton could have been of such immense size, but the dimensions given by report may either have been the result of pure exaggeration, or may have arisen from the finding together of the bones of several elephants in an indistinguishable mass, which might suggest the idea of a single skeleton of colossal size.

In the ancient Greek world healing virtues were sometimes attributed to the bones of dead heroes, just as, in a somewhat similar way, virtues were and still are believed to exist in the relics of Christian saints. Thus a supposititious rib of the mythical hero Pelops was greatly honoured for its remedial power, and the fact that the supposed bone was really a piece of ivory only enhanced its value instead of causing any doubt of its authenticity. A similar curative power was accredited to the great toe of King Pyrrhus of Epirus, if we are to credit Pliny's report.* When the King's body was cremated this toe would not burn, and it was preserved as a temple treasure. Virgil, indeed, writes of the "wonderful ivory shoulder-blade of Pelops." A "gold and ivory" thigh bone of the philosopher Pythagoras was another object of reverence; this probably refers to a gold setting of the ivory, just as some of the more famous medieval relics were provided with a rich golden setting. That the bone should be of ivory was perhaps thought to indicate the supreme and almost miraculous beauty of the hero's or philosopher's physical form.

The Königliches Naturaliencabinett in Stuttgart can boast of having some of the finest remains of extinct elephant species, for the deposits of Württemberg are excep-

*Plinii, "*Historia naturalis*," Lib. VII, cap. 2; cited in Petri Friderici Arpe, "*De prodigiis naturæ*," Hamburgi, 1717, pp. 19, 20.

tionally rich in this respect. A mammoth tusk found here in 1605 is suspended in the choir of the Michaeliskirche at Hall; this is the earliest Suabian find certainly known, although Cuvier had heard or read of a tusk found in 1494. By far the most important of these discoveries was that of the nearly complete skeleton of a mammoth found August 6, 1910, in the rubble of Steinheim-on-the-Murr, of middle Pleistocene age. A careful study of the position of the separate parts of the skeleton led to the conclusion that the mammoth had not died on the spot, but that its dead body had been borne down by the river, and had stranded on a gravel bank, where it was gradually buried beneath the sand deposits. The bones were yellowish in colour and had lost nothing of their form; the tusks were also quite perfect as to form, but in structure they had suffered more than many others from the deposits of this region. The chief dimensions of the mammoth are given as follows:

Height to top of scapula	12 ft. 1 in.
Length from tip of tusk to first caudal vertebra	16 ft. 7 in.
Length to end of tail	17 ft. 3 in.

Doctor Dietrich of Berlin has bestowed the name *Elephas primigenius Fraasi*, Dietr., upon this species of mammoth as characteristic of the Württemberg type, and in honour of palæontologist Prof. Dr. E. Fraas of Stuttgart, who died in 1915.*

The curious superstition that illness would befall any one who unearthed the complete body of a dead mammoth is prevalent among the Lamuts of northeastern Siberia, although they do not hesitate to take off and utilize the tusks wherever these may be found. This probably goes to prove the rarity of such remains in a relatively perfect state and it

*O. W. Dietrich, "*Elephas primigenius Fraasi*, eine schwäbische Mammutrasse," Stuttgart, 1912.

may be due to this superstitious dread that neither the original native discoverer of the Beresovka mammoth in 1900, nor those of his tribe to whom he shortly afterward communicated his discovery, dared to make any effort to remove the body.*

The finding of the remains of a mammoth in northern Siberia at the end of the seventeenth or the beginning of the eighteenth century is reported by the Dutch traveller, Isbrand Ides, his informant being a native, who made yearly trips in search of fossil ivory. This man stated that he and a companion once found the head of a mammoth or elephant which had become freed from the enveloping ice. The tusks were still attached to the head and were only broken off with considerable difficulty; some flesh in an advanced state of decomposition still clung to the skull. Working down through the ice they came upon one of the forelegs, a piece of which they cut off and took to the city of Trugan. On the neck of the animal they saw something red that looked like blood. Ides was told by the natives of this region that the subterranean wanderings of these mammoths were sometimes betrayed by a sudden upheaval of the soil, which would then fall in, forming a deep pit. He was also told by one of the natives that the latter had found a pair of tusks weighing the equivalent of 400 Dutch pounds. Even at this early period considerable fossil ivory was taken to Russia and worked up into combs and other objects.†

The growth of popular legend that often results from an effort to find an explanation for some strange and apparently mysterious fact is shown in the case of the natives of the Liakhov Islands in northern Siberia. They explain the existence of the immense deposits of the bones and tusks of

*See O. F. Herz, in *Bulletin de L'Académie des Sciences de St. Pétersbourg*, Ser. V, Vol. XVI, pp. 147, 148 (text in Russian).

†Ides, "Driejarige Reize naar China," Amsterdam, 1704, p. 31.

extinct elephants by the theory that these animals existed beneath the soil, and were destined by nature to pass their lives in perpetual darkness, but in the course of their subterranean burrowings they would ever and anon work their way up to the surface, and when they emerged were instantly killed by the light.* Similar notions as to the origin of deposits of fossil ivory have been reported from points near the Chinese frontier where fossil ivory has been found.†

The Scotchman, John Bell, who accompanied the Russian envoy Ismailov to Peking in 1719–1722, also gathered up some strange stories regarding the Siberian elephants, which were represented to be amphibious creatures, never to be seen except on the banks of rivers or in marshy land, and that only in the night time or at break of day. If they became aware that they were watched they would immediately plunge into the water to hide themselves.‡ About this time a *pud* (36 pounds) of fossil ivory cost but from three to four rubles.** The report of this journey is believed to have induced Peter the Great to issue, in 1722, his orders to seek for fossil ivory.

By many the “fossil ivory” of Theophrastus has been not improbably identified with the so-called bone turquoise or odontolite. The description of the appearance of this “fossil ivory” given by the Greek author, “dark blue marked with white,” is not inappropriate to the fossil bone or ivory tinged by iron phosphate that goes by the name of “bone turquoise.”§

Some idea of the quantity of Siberian mammoth ivory supplied to the London market in 1872 and 1873 may be de-

*D'Archaic, in *Revue des Cours Scientifiques*, Vol. I, p. 457.

†Pictet, “*Traité de Paléontologie*,” Vol. I, p. 281.

‡Bell, “*Travels*,” Glasgow, 1763, Vol. II, p. 147.

**Muller, “*Sammlungen zur russischen Geschichte*,” Vol. III, p. 561

§See King, “*Natural History of Gems*,” London, 1867, p. 60.

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rived from the statement of Mr. Westendarp that 1,165 mammoth tusks were received there from Siberia in 1872, and 1,140 tusks in the following year, each of these weighing from 140 to 150 pounds. However, only about 14 per cent. of this material was of the first quality, 17 per cent. being still useful though of inferior quality. More than half was very poor and 15 per cent. entirely worthless.*

The French zoölogist, Doctor Trouessart, holds out the hope that in case the African source of supply for ivory should show signs of exhaustion, through the killing off of the elephants, Siberian mammoth ivory might suffice to provide the requisite material. He believes that what has already been taken from this source is but a small fraction of the deposits, and that if deep excavations were made, perhaps using dynamite to blast out the ground, very rich deposits would be encountered, and he declares that "there is every hope of finding a precious reserve in the fossil ivory of Siberia."†

The Muséum d'Histoire Naturelle in Paris is now in possession of the remains of a Siberian mammoth with its soft parts partially preserved. The only other specimens of this kind are in the Imperial Museum of Natural History in Petrograd. That now in Paris was extracted by the orders and at the expense of Count Stenbok-Fermor from one of the islands of the New Siberia group, and there is little likelihood of another such mammoth being seen in Central Europe, as the exportation of mammoth remains has recently been prohibited by imperial ukase.‡

The remarkable preservation of certain mammoth remains embedded for tens of thousands of years in Siberian

*Smithsonian Institution Annual Report for 1899, R. Lydekker, "Mammoth Ivory," p. 366.

†See Smithsonian Report for 1899, R. Lydekker, "Mammoth Ivory," p. 366, Washington, 1901:

‡*Chemical News*, July 25, 1913, p. 46.

ice blocks has been proven to extend even to the blood of these extinct mammals. In preparing the fine specimen recently acquired by the Muséum d'Histoire Naturelle of Paris, some brownish drops were found in one of the veins, and analysis revealed the fact that they were blood drops, which still retained their liquid state, although the pulsating heart had ceased to beat perhaps 40,000 years ago.* As we have already noted clotted blood was also found in the chest of the great mammoth from Beresovka, recently set up in the Petrograd Museum of Natural History.

A law at present in force in Russia provides that all mammoth tusks taken from the Siberian region shall be sent to the Academy of Sciences in Petrograd, but the provisions of this law are evaded or at least not fulfilled by the natives, Ostiaks, and others, who are probably quite ignorant of its existence. Such tusks as are still found—the quantity is constantly diminishing—show a maximum diameter of about 20 cm. (nearly 8 in.), a maximum length of 2 metres, a little over 6½ ft., and a maximum weight of 150 kilograms, or about 330 pounds. The natives are ready to exchange any they may find for powder or flour, but more especially for liquor. The finding of any extraordinary specimen is, however, generally reported to the Academy. The price of this mammoth ivory as used in the arts is from 50 kopecks to 2 rubles for a Russian pound (420 grams). Billiard balls are produced to a certain extent in Moscow and St. Petersburg, and ateliers in Tobolsk and Cheliabinsk furnish a considerable variety of objects, such as crucifixes, small statues, groups of Ostiaks, figures of reindeer, bears, and other animals. Where the tusk is of sufficient size it not infrequently happens that the artist decorates it with such figures carved in relief. While this work may

*Communication of Prof. G. Onésime Clerc of Ekaterinburg, Russia.

not claim the highest artistic merit, its fidelity to nature lends it a particular charm.*

The molar of an elephant has been found in the island of Luzon, Philippines. This was probably brought thither from India. On the island of Mindanao a tooth of *Stegodon trigonocephalus mindanaoensis* was discovered. This genus stands between the mastodon and the modern elephant, although more nearly resembling the latter. This is the only instance on record of the finding of such remains in the Philippine Islands. The tooth was found in the north-western part of the island, and is at present in the Ethnological Museum at Dresden (No. 2679). The discovery was made by Semper, who described it as "a tooth of the war god Tagbusu of the Manobos, only to be worn by a Bagani (a priest or a prince); it was used as a talisman." The tooth is bound with varicoloured strings, so attached that it could be worn suspended.†

The fact that the mammoth remains so far found in Alaska are in a much inferior state of preservation than those discovered in Siberia has been very reasonably adduced as a proof that these animals became extinct at a much earlier date in Alaska than in Siberia. There seems also to be little doubt that most of the Alaskan mammoth remains are not in their original place, but have been carried by water or ice drift for a long distance from the spot where the animals perished. All these Alaskan remains of the Pleistocene age have been determined to be those of *Elephas primigenius*. These remains are not confined to the mainland, as a few have been found on islands of the Pribilof group in Bering Sea. Whether their existence can be

*Communicated by Prof. G. Onésime Clerc of Ekaterinburg. For further details regarding mammoth tusks see pp. 234-240, 387 sqq.

†Dr. Edmund Naumann, "Fossile Elephantenreste von Mindanao, Sumatra, und Malakka," in Abhandl. u. Berichte d. Königl. Zoölog. u. Anthropol.-Ethnolog. Museum zu Dresden, 1886-7; No. 6, pp. 5-8, Berlin, 1887.

safely taken as a proof that these islands were connected with the mainland during the period in which the mammoth wandered through Alaska, or whether the bones and tusks that have been found were washed up by the ocean after having been borne to the sea by the mainland rivers, is a question not easily to be decided. Indeed, it has been regarded as probable that the Pribilof Islands are of very recent geologic formation and did not exist in the time of the Alaskan mammoth.*

As regards the Alaskan mammoth, Maddern states that the lowest horizon in which remains are found here are the lacustrine facies of the "Yukon silts" or the "Kowak clays," and he considers the peculiar ice phenomena of Eschscholtz Bay, the ancient ice beds beneath a covering of soil, to be an example of "former lake-shore conditions, as is also the locality in the Beresovka River in north-eastern Siberia described by Tolmatschow."†

There appears to be a general agreement among all those who have described the finding of mammoth remains at or near Elephant Point that they are never met with in the ice bed or in the earthy layers above this, but, whatever their actual location at the time of discovery, have come from the clay stratum below the ice layer. Indeed, the most probable explanation of the greater part of these occurrences is that the bones or tusks were drifted down the Buckland River on floating ice,‡ as were also blocks of sandstone and basalt found on the beach.

In the report of the voyage of the British ship *Herald*

*A. G. Maddern, "Smithsonian Exploration in Alaska in Search of Mammoth and Other Fossil Remains," Smithsonian Miscellaneous Collections, Part of Vol. XLIX, Washington, 1907, p. 7, and 21, 22.

†Maddern, "Smithsonian Exploration in Alaska in 1904, in Search of Mammoth and Other Fossil Remains," Smithsonian Miscellaneous Collections, part of Vol. XLIX, pp. 25, 38.

‡Maddern, op. cit., pp. 61, 62.

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during the years 1845-1851, it is noted that in 1848 there were gathered from the stratum of alluvium covering the hidden glacial layer at Eschscholtz Bay eight mammoth tusks "the largest of which, though broken at the point, was 11 ft. 6 in. long," 21 in. in circumference at the base, and weighed 243 pounds; besides this fine tusk, molar teeth, thigh bones, and ribs of the mammoth were discovered.*

The results arrived at by Maddern were confirmed in 1907 by Charles W. Gilmore in the course of another Smithsonian Expedition to Alaska. While mammoth remains of Pleistocene age were found in the black mud accumulated in the stream valleys and in the Yukon silt and Kowak clays, almost all seem to be far removed from their original locality. Among the few cases in which there appears to be an approach to a primary disposition is the deposit at Fox Gulch, Bonanza Creek, Yukon Territory, Canada, at a distance of twelve miles from Dawson. At this point, in a short deep gulch cut through the quartz drift, covered by a thin layer of auriferous gravel, on which has been deposited a thick layer of muck, were found many beautifully preserved fossils, including a complete skull of a mammoth and a large tusk, which protruded from the face of the undisturbed muck.† An exceptionally fine relic of *Elephas primigenius* was a skull with both tusks, found in March, 1904, forty-two feet down in the muck of Quartz Creek, near Dawson, Yukon Territory, Canada.‡

That the date to be fixed for the extermination of the fauna whose remains are found in certain deposits cannot safely be deduced from the depth at which they are found

*Berthold Seemann, "Narrative of the Voyage of the H. M. S. *Herald*. During the Years 1845-51, under Captain Henry Kellert, R. N.," Vol. II, pp. 34, 35.

†Charles W. Gilmore, "Smithsonian Exploration in Alaska in 1907 in Search of Pleistocene Fossil Vertebrates," Smithsonian Miscellaneous Collections, part of Vol. LI, Washington, 1908, pp. 14, 15; see plate IV, Figs. 1 and 2.

‡Gilmore, op. cit., p. 25, Pl. VII.

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is asserted by Charles W. Gilmore, because the greater weight of certain bones or tusks may have caused them to work deeper into the soft soil in which they are deposited in the course of a long lapse of time. As to this Mr. Gilmore writes:*

“Their presence here may be accounted for on the supposition that the animals became mired in the bogs before they became solidly frozen as they are now. This naturally raises the question: If mired down in such a place, why is it that the remains should be so universally scattered?” The writer suggests that they may have been separated by the creeping of the muck or peat—a phenomenon familiar to all students of deposits of this nature. By such creeping the muck may have moved considerable distances, particularly where the flow is inclined, as in many of the gulches. From the fact that most of the bones occur in the lower layers of the muck, no matter what the depth of the deposits may be, it is apparent that their specific gravity has caused them to sink to their present resting-places. Thus it would not be necessary for the extermination of the fauna to have taken place at one time, as might be inferred by their occurrence at one level.

The mammoth tusks found in Alaska are not in a sufficiently good state of preservation to compete with the Siberian fossil ivory, for they are usually badly discoloured and exfoliated. Still parts of them have been successfully worked up as curios into the form of paper-weights on which were engraved representations of Alaskan scenes. Often the hairy mammoth is depicted, many of these carvings or etchings being the work of native Eskimo carvers. The dealers in Skagway draw their material principally from the

*Charles W. Gilmore, “Smithsonian Exploration in Alaska in 1907 in Search of Pleistocene Fossil Vertebrates,” *Smithsonian Miscellaneous Collections*, part of Vol. LI, Washington, 1908, p. 25.

Klondyke region, while that brought to Nome usually comes from Eschscholtz Bay or from the Buckland or Kobuk rivers. Pieces of tusks shaped into sled runners were seen by Gilmore, and he also saw some sections formed into weights for working salmon nets. A notable by-product of this Alaskan ivory is a blue dye derived by the Eskimo from the blue phosphate of lime (vivianite) formed by the decomposition of some of the tusks.*

The effect of an endless chain of newspaper items, leading on to the production of a cleverly written hoax retailing the killing of a living mammoth in Alaska, is related by Dr. F. A. Lucas in his "Animals of the Past." It appears that when, twenty or more years ago, the United States revenue cutter *Corwin* was anchored at Kotzebue Sound in Alaska, the natives of this region, which is rich in remains of the extinct mammoth, brought many fine specimens on board to sell to the visitors. When questioned as to the origin of the remains these native Innuits replied without hesitation that no living mammoth had ever been seen, and then asked their white questioners whether the latter had ever seen these animals. As chance would have it, there was on board a copy of one of the reports of the Petrograd Geographical Society, containing a representation of the great mammoth skeleton set up in the Petrograd Museum of Natural History. This was shown to the natives, and they were delighted to be able to recognize the long curving tusks with which they had grown familiar. As the skeleton, however, did not quite satisfy them and they begged to have a picture of a living animal, Dr. C. H. Townsend took pity on them, and having passed some time in Ward's establishment in Rochester when a replica of the Stuttgart restoration of a mammoth was being made, he sketched out on a sheet of paper the animal figure

*Charles A. Gilmore, op. cit., pp. 28, 29.

as he remembered it. This sketch was taken off to shore as a great treasure by the natives, and as they are clever copyists, it was multiplied many times over and the copies widely circulated from hand to hand throughout the region. Thus it came about that when questioned by travelling newspaper men, the natives were generally able to give what seemed to be a very plausible account of the appearance and habits of mammoths, so much so that these enterprising knights of the pen felt little hesitation in reporting the actual existence of living individuals of this long-extinct species in out-of-the-way parts of our immense Alaskan territory. As usual, these news items were copied from paper to paper, gaining a certain strength by repetition, and at last forming the framework for a very well-written tale of the "Killing of a Mammoth," by Mr. H. Tukeman, which was published in *McClure's Magazine* in 1899, and was so circumstantially narrated that questions came pouring into the museums for further details on the subject. As the narrator at the close of his tale had given the information that the skin of the recently slain mammoth was to be set up in the Smithsonian Institution in Washington, the director was of course overwhelmed with inquiries from those who were eager to view it, and it was some time before the fact could be made generally known that the whole affair was only a literary mystification.*

The care that should be exercised in determining the true source of ivory material used industrially is rendered apparent by the following account:†

"In 1904 the writer saw sections of mammoth tusks in the curio shops at Nome that had been polished and carved by the Eskimo of King Island in Bering Sea. The fact that

*Frederic A. Lucas, "Animals of the Past," New York, 1901, pp. 190 sqq.

†The Smithsonian Miscellaneous Collections, Vol. XLIX, Washington, 1905, p. 22, A. G. Maddern, "Smithsonian Exploration in Alaska in 1904."

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natives from that place sold these to dealers in Nome is the basis for the statement, by the dealers, that the ivory comes from King Island, but it appears most likely that the tusks were obtained from the Alaskan mainland, which is visited each summer by these islanders, and carried to their settlement for the purposes of manufacture and thence to Nome for sale."

It is not only in the frozen north, in Alaska and Siberia, that the ivory of the extinct mammoth is well enough preserved to render it available as an industrial material to-day, but even in England an elephant tusk found on the coast of Yorkshire near Bridlington was in such an excellent state of preservation that a good part of it was utilized by an ivory turner for the making of boxes. A fragment of this Yorkshire tusk was found on comparison to differ but little in appearance or condition from those obtained in or at the foot of the cliffs at Eschscholtz Bay, Alaska.*

The persistent, circumstantial, and apparently trustworthy reports that the body of a mammoth still in a good state of preservation had been discovered in Alaska induced the sending of an expedition in 1907, by the American Museum of Natural History; in 1908 a second attempt was made in the same field. These expeditions, planned by Prof. Henry Fairfield Osborn and Director H. C. Bumpus, were carried out by Dr. L. S. Quackenbush, who has supplied a very full account of the results attained.† As it was soon demonstrated that the newspaper reports of the finding of an entire mammoth were devoid of foundation, the efforts of the explorer were more especially directed to the historic Esch-

*Smithsonian Miscellaneous Collections, Vol. XLIX, Washington, 1905, A. G. Maddern, "Smithsonian Exploration in Alaska in 1904," p. 82, citing Doctor Buckland's notes of an expedition of 1828.

†"Notes on Alaskan Mammoth Expeditions of 1907 and 1908," by L. S. Quackenbush; Bulletin American Museum of Natural History, Vol. XXVI, pp. 87-130; New York, March 24, 1909.

scholtz Bay district, and especially to that part comprising Elephant Point and the neighbouring cliffs and ridges. The early explorers of a century ago had already found mammoth remains in or near the strange glacial formations here, and many theories were propounded to account for their presence therein and for the origin of the glaciers themselves.

The channel of Eschscholtz Bay runs from the mouth of the Buckland River, at the bay's southeastern end. Its waters are quite shallow, and the depth of the channel at Elephant Point has been found to be only from fifteen to twenty feet. The tides here vary much from time to time, with an average rise of about three feet from low water. Owing to the shallowness of the water these tides exercise a marked effect.

The fossil-bearing bluff, some three miles and a half in length, first noted by Kotzebue in 1815, is situated between the base of Elephant Point and a vertical rocky cliff, at the southern entrance of the bay, and at the western margin of a Pleistocene deposit of fine micaceous silt or clay. The fossil-bearing bluff does not cease at Elephant Point, but is prolonged behind it and parallel with the shore of Goose Bay to the southward and eastward.*

Of all the fossil mammoth remains found on this historic bluff the most interesting was the distal end of a fractured thigh bone, to which adhered pieces of soft flesh and tendon. Subsequent investigation indicated that part of a mammoth skeleton was embedded here in its primary entombment. Of this incomplete skeleton the following parts were found: the right innominate bone, femur, tibia, and fibula, four of the small foot bones, the lower jaw with the teeth, two tusks, a number of small fragments of the skull, six thoracic vertebræ, several caudal vertebræ, and the end of the tail encased

*L. S. Quackenbush, "Notes on Alaska Mammoth Expeditions of 1907 and 1908," *Bulletin of the American Museum of Natural History*, Vol. XXVI, Art. IX, pp. 89-130, New York, March 24, 1909; see pp. 94 sqq.

in skin and hair; there were also several broken ribs, and a small quantity of flesh, skin, hair, and wool. All these remains were comprised within a small area, 10 by 7 ft., on the exposed face of the knoll, and the missing parts are assumed to have been carried away by the slide which bore off a portion of the face of the knoll.*

The Alaskan region in which most of the Eskimo ivory carving is done lies between the Yukon delta and the lower Kuskokwin, much work of superior excellence being produced in the villages of Askinuk, Kushunuk, Agiukchugumut, and other neighbouring settlements. The attractive carvings made by the Eskimo people of Ukagamut were in strongly marked contrast with the squalid conditions of their life. It was also noted that these Alaskan Eskimos had no high opinion of the value of their work, for they were usually very eager to trade off a pretty carving for one or two needles, a brass button, or some such objects of trifling value.† Still the needles, at least, may have had a much greater value for the Eskimo than the visitors supposed.

Either because of a superstitious fancy, or because of some ascertained practical advantage, the Eskimos of Alaska utilize human fluids to a great extent in the preparation and ornamentation of their fossil or walrus ivory, for it is said to be customary with them to soak the material thoroughly in urine in order to soften it before cutting and carving. It is also frequently moistened with this liquid as the work progresses. Blood mixed with gun-powder is used to make a black dye, which is rubbed into the freshly cut incisions forming the design, to stain them permanently and thus bring them into greater relief.‡

*Quackenbush, op. cit., pp. 107 sqq.

†Edward William Nelson, "The Eskimo About Bering Strait," 18th Annual Report of the Bureau of American Ethnology, 1896-97, Washington, 1899, Pt. I, p. 196.

‡Edward William Nelson, "The Eskimo About Bering Strait," 18th Annual Report of the Bureau of American Ethnology, 1896-97, Washington, 1899, Pt. I, p. 196.

Remains of the extinct mastodon have been found in many different localities in the State of California, and indeed in the Pleistocene period these animals existed all over North America, with the possible exception of the northeastern corner along the coast of Labrador, and farther northward. In California the prevalence of the mastodon remains in the Coast Ranges and along the foothills of the Sierra up to an elevation of some two thousand feet indicate that region as the habitat of the mastodon. At a higher elevation than two thousand feet the bones are occasionally met with, but there are none or scarcely any to be found past the three thousand foot mark. It is along the limestone bed in the vicinity of Sonora and Colombia that the most numerous mastodon remains have been unearthed, and cartloads of these bones have been taken from limestone crevices at various points between Sonora and the Stanislaus River. However, most of this material has been lost through fires in the mining camps or has crumbled away on long exposure to the outer air. In the later seventies some fine mastodon skulls were still to be seen in a mining camp at Sonora, and about this time occasional specimens were taken to San Francisco for exhibition, but they failed to elicit proper attention, and the exhibitions, as speculative ventures, were not successful.* By far the greater part of the remains belong to the American mastodon (*Mammut americanum*).

The remarkable skeleton of *Elephas imperator* set up in the Los Angeles County Museum of History, Science, and Art, at Los Angeles, California, is one of the largest known. It has been assembled from the deposits found in an asphalt pit at Rancho La Brea, near Wilshire Boulevard in the outskirts of Los Angeles. The height of this skeleton at the

*J. D. Whitney, "The Auriferous Gravels of the Sierra Nevada of California"; Mem. of the Mus. of Comp. Zool. at Harvard College, Vol. VI, No. 1 (1st Pt.), Cambridge, 1879, pp. 251, 252.

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shoulder is 13 ft. 6 in. and the length from tip of tusk to pelvic bone is 25 ft. Out of 98 pits opened the bulk of the elephant remains came from a single pit, No. 9, which has been designated the Elephant Pit, and this furnished several single tusks of considerably greater length than those mounted in the skull of the Imperial elephant specimen. One of these fossil tusks is 15 ft. long, while another has the altogether exceptional length of 16 ft., almost, if not quite, equalling the remarkable example in the Instituto Geologico of Mexico City. The enormous mass of fossil remains of extinct animals gathered from these asphalt pits may be better understood when we state that there are in the Los Angeles County Museum 3,500 boxes of these remains of which the Sabre-tooth furnished 630; the Giant Wolf, 700; fossil elephants, 17; mastodons, 7; Giant Sloth, 40; camels, 7; and lions, 16. These relics were gathered together under the care and direction of Director Frank S. Daggett of the Museum.

The asphalt pits at Rancho La Brea, containing elephant and mastodon remains, are believed to have been formed in geological times after the occurrence of a fault in the shale strata. Along the course of this fault it is supposed that imprisoned gases violently forced their way to the surface, producing a series of blowholes or pits. Gradually these became filled up with water and tar seepage, some of the animal remains being drawn into them with the liquid substances, while others again may represent animals that were actually trapped into the tar-pits by sinking therein, after the tar had formed an adhesive mass reaching up to the surface of the pit. The progress of investigation of these deposits has led to the conclusion that all the Pleistocene animal remains are confined to these blow-out holes along the line of the fault.*

*Communicated by Director Frank S. Daggett of the Museum of History, Science, and Art, Los Angeles, Cal.



REMAINS OF MAMMOTH, MASTODON, AND OTHER EXTINCT SPECIES

FROM THE DEPOSITS AT RANCHO LA BREA, LOS ANGELES COUNTY, CALIFORNIA, IN THE LOS ANGELES COUNTY MUSEUM OF HISTORY, SCIENCE, AND ART. FRANK S. DAGGETT, DIRECTOR.

LOOKING BACK THROUGH THE HALL FROM THE FOREGROUND MAY BE SEEN FOUR LARGE MOUNTED SKELETONS, AS FOLLOWS: 1. MAMMOTH (*MAMMUT AMERICANUM*); 2. ELEPHAS IMPERATOR; 3. GIANT GROUND SLOTH (*MYLODON HARLANI*); 4. ANCIENT BISON (*BISON ANTIQUUS*). IN THE REAR TO THE RIGHT, BETWEEN THE LEGS OF THE IMPERIAL ELEPHANT, IS TO BE SEEN THE SKELETON OF A SABER-TOOTH (*BIMILODON CALIFORNICUS*); ON THE OPPOSITE SIDE, TO THE LEFT OF *BISON ANTIQUUS*, IS A SKELETON OF THE GIANT WOLF (*CANISDIRUS*). IN THE BOTTOM OF THE CASE IN THE IMMEDIATE FOREGROUND ARE MANY SPECIMENS OF THE SABER-TOOTH.



RANCHO LA BREA

WHENCE CAME SOME REMARKABLE FOSSIL REMAINS OF THE MAMMOTH AND OTHER EXTINCT ANIMAL SPECIES. THE OLD RANCH HOUSE IS SEEN IN THE FOREGROUND TO THE RIGHT THE RICHEST FOSSIL PITS ARE IN THE BACKGROUND, TO THE RIGHT OF THE TELEPHONE POLE.

LOS ANGELES, CALIFORNIA



RANCHO LA BREA, SECTION OF "ELEPHANT PIT" (PIT NO. 9)

SHOWING TEETH OF ELEPHANT AND VARIOUS BONES IN SITU

LOS ANGELES, CALIFORNIA

In connection with the catastrophe which seems to have overtaken the luckless animals whose fossil remains have been dug out of the asphalt beds at Rancho La Brea, it is not uninteresting to learn from a Californian who lived many years ago on a ranch directly opposite La Brea, that cattle and even squirrels sometimes came to grief on his ranch, being swallowed up by the earth in a similar way, especially in wet weather. So swampy was the soil that no bottom could be touched when a long pole was driven down through it. Although he states that there was no asphaltum on his ranch, still his experience illustrates the possibility of animals sinking to their death in traversing a treacherous soil along, or in the immediate neighbourhood, of the great fault running through this region.*

A tract of 32 acres, covering these fossil beds, has recently been donated to Los Angeles County, by Mr. Hancock, for park purposes. The more or less restored pits will thus have beautiful surroundings and will become a point of pilgrimage for scientists.

The La Brea mastodon and mammoth are undoubtedly Pleistocene, but the numerous fragmentary remains found in the gold-bearing gravels and elsewhere in California are many of them older, Pliocene or perhaps Miocene. To these older species probably belong the various teeth and fragmentary specimens which have been referred to: *M. obscurus*, *mirificus*, and other Eastern species, and also the South American *M. andium*. None of these species are true mastodon; they are related to the more primitive *Trilophodon*, *Tetralophodon*, and *Stegomastodon* (or *Dibelodon*) of the Miocene and Pliocene.

Not long since the skull of a mastodon, with eight-foot tusks still intact, was washed up on the Pacific Coast a little south of Santa Barbara, California.

*Communicated by Mr. Arthur Hutchinson.

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Bones of the extinct American elephant have also been brought to light in many different parts of the State of California. Probably the most valuable discovery of this kind was that of a complete fossil skeleton found near Fresno River, in a solid bed of yellow clay, at a locality twenty miles distant from Millerton, the county seat of Fresno County. This was carefully examined and studied by Dr. E. C. Winchell in 1866. The skull, vertebræ, and tail bones lay in the relative natural order over a space 20 ft. in length; the skull itself measured 4 ft. in length and 2 ft. in width. The jaw bore two massive black tusks, 6 ft. 4 in. long, having a pronounced outward curve so that the tips were from four to five feet apart. The diameters at the base, and for 4 ft. 6 in. of the length, were 6 in.; from this spot the tusk tapered to a point. The black surface coloration was a quarter of an inch thick, the interior of the tusk being white, and did not appear to have been caused by any ingredient in the soil. Every effort was made to remove the tusks uninjured from the enclosing clay, but unsuccessfully, as they crumbled away when the slightest pressure was exerted.*

Of the final disappearance of both mastodon and elephant from North America, which Professor Winchell regards as due to "those subtle and little understood influences that bring about changes in the nature of the organic life of various regions of the earth," he says:†

"It would be difficult to find a more striking example of the working of this mysterious cause than is presented in the entire disappearance of the mastodon and elephant, almost during the historic period, and very nearly at the

*J. D. Whitney, "The Auriferous Gravels of the Sierra Nevada of California"; *Mem. of the Mus. of Comp. Zoöl. at Harvard College*, Vol. VI, No. 1 (1st Pt.), Cambridge, 1879, pp. 254, 255.

†J. D. Whitney, "The Auriferous Gravels of the Sierra Nevada of California"; *Mem. of Comp. Zoöl. at Harvard College*, Vol. VI, No. 1 (1st Pt.), Cambridge, 1879, pp. 320, 321

same time, from over an area of some millions of square miles."

Many and various causes may occasion the death of great numbers of animals in a short space of time. For example, climatic changes, absence of water, great depth of snow, or certain extreme changes of temperature. Dr. Bailey Willis mentions that, in parts of the Argentine, animals are dependent for water upon ponds in water-holes, around which frequently hundreds of cattle will congregate, and in dry years these water-holes contain less and less of water until they finally dry out completely, thus causing hundreds of animals to die of thirst.

We know that in our Western country for many successive years horses, cattle, and sheep can safely depend upon the forage on the plains for their sustenance, but there come years when the snow is too deep and when a large percentage perish. It is quite possible that some such climatic change as an unusually deep snow or a very intense cold caused the death and extermination of the mammoth. In Alaska and in Siberia, when an animal dies in a great mass of snow and ice, the remains will probably be preserved, as were those of the two great mammoths that have been found in Siberia. Though it is quite possible that an animal may die and be thus preserved, as were the mammoths that have been found; still the extermination of the great proboscidi-ans that existed from the most northerly clime to the end of Patagonia remains a mystery.

The structure of mastodon teeth suggests that the animal consumed soft herbage and could not exist in an era of great cold, and it is quite possible that as mastodon skeletons are frequently found in swamps, the animals had met their death there while in search of food. The fact that mammoth teeth are made up of cellular rings, Siberian (*E. primigenius*) mammoth teeth being more highly specialized

than even those of the modern elephant, suggests that they ate hard food, such as pine needles, and that the teeth might be called "needle grinders." It is an open question whether the mammoth could live in Siberia at the present time—whether there are enough conifers and other similar trees at the present time to supply them with the requisite food, although as we have stated the tangible evidence supplied by the more complete remains shows that these particular animals had subsisted on other vegetable growths. Possibly this may have involved a change of diet that acted unfavourably upon the species.

At birth elephants are generally covered with what is known as laguno, or prenatal hair, just as the human embryo at the seventh month of the foetal period is covered with hair, and the head sometimes with a growth of hair at birth, this falling out and longer hair taking its place. This laguno is found on both the Asiatic and African elephant. As there is no necessity for the hair, the animal requiring no warm covering, a new growth of hair does not come in, but it is surmised that the laguno was retained by the mammoth, and that the coldness of the climate caused thicker hair to grow, possibly in the autumn or early winter. This would suggest that the climate must have been a severe one, and it is claimed by Lull and others that the mammoth, in some regions at least, fed upon small leaves of the Conifer (pine) Family. However, it must be noted that the very considerable food remains (some 22 pounds in weight) that were found in the stomach of the Berezovka mammoth from Siberia did not include any material from conifers, and the same appears to be true of the plant forms associated with the Borna mammoth from Saxony. As to the hairy growth, it certainly appears most probable that this took place in the autumn. As there is so little seasonal change in the regions now forming the habitat of the African and



EMBRYO OF AN ELEPHANT

AT EIGHT MONTHS, OR ONE THIRD OF THE TWO YEARS OF GESTATION

COURTESY OF MR. CARL E. AKELEY



SNAKE RIVER AND CANYON WALLS

WITH SAND HILLS IN THE DISTANCE, CHERRY COUNTY, NEBRASKA. HERE HAVE BEEN UNEARTHED VERY RICH DEPOSITS OF MASTODON REMAINS.

FROM NEBRASKA GEOLOGICAL SURVEY, VOL. IV

Indian elephants, nature did not find it necessary to produce any such protection.

There is no reason to conclude from the immense mass of mammoth remains to be found in some parts of the world that many more animals of this kind than of the various other large animal species existed in prehistoric times in these regions. The great abundance of mammoth tusks and teeth is rather to be attributed to the fact that they were larger, harder, and hence less subject to decay than the smaller ones of other animals. Hence while in many instances they have become fossilized, the bones of smaller animals, birds, etc., would pass away in a few years. On the other hand, the slow disintegration of the surface of the large tusks and teeth not seldom acted as a preservative for the interior masses.

Nevertheless, we are justified in assuming that the number of great mammoths living at one time must have exceeded that of the elephants existing to-day in Africa. Judging from the large quantity of remains found in Alaska, the thirty separate examples discovered in the State of Indiana, the numbers found in New York, Nebraska, Texas, California, and elsewhere in the United States, it is evident that even on this continent mammoths existed in great numbers, and yet, through some strange law of nature, they have entirely passed away almost with the advent of civilized man.

A brief mention will later on be made of the mammoth bones discovered at Borna, Saxony.* An interesting circumstance in this connection was the finding of fragmentary plant remains almost certainly of the Glacial Period. The bones of the nearly complete skeleton found here were scattered over an area about 45 ft. wide and 50 ft. long, and although the relative position of the bones was not in

*See p. 394.

the main broken up, they were somewhat widely separated. This may have been due, in the opinion of Professor Felix, to the action of some stream which may have traversed the pool or body of standing water in which the mammoth is supposed to have come to grief.*

The finding of the skeleton of an American mastodon in Connecticut is not only highly important in itself, but the position and surroundings of the remains have suggested some very interesting conjectures as to the possible co-existence of man and mastodon in this part of North America in post-glacial times.† This find was made in August, 1913, on the estate of the late A. A. Pope, at Farmington, in the course of excavations made for the draining of a bit of swamp land. The Italian workman who first came across the skeleton announced his discovery to the superintendent with the words that he had found "a black devil" in the bog. The remains were removed with the greatest possible care, although unfortunately the skull had been somewhat damaged by the workman before he became aware of what it was. Almost all the essential parts of the skeleton were present, and one of the tusks was recovered at some distance from the other remains. The bones were somewhat scattered, and lay on light-blue boulder clay, a glacial ground moraine deposited during Wisconsin time. It is not believed that the animal lost its life from having become entangled in the bog, but that it died a natural death; the appearance of the bones indicates that the skeleton must have soon become buried by the enveloping clay. It has been estimated that a few hundred years would cover the time required for the clay to be washed into the depression, and the fact that the skeleton must

*Johannes Felix, "Das mammuth von Borna," Leipzig, 1912.

†See Charles Schuchert, "Mammut Americanum in Connecticut," with note by Richard S. Lull, *Am. Jour. Sc.* 4 Ser., Vol. XXXVII, pp. 321-330, No. 220, April, 1914.

have been entombed shortly after the disappearance of the Wisconsin ice sheet seems to indicate that this period was not so very remote and has suggested the query: "Can it be that *Mammut americanum* vanished from Connecticut within a thousand, or at most a few thousand years, and yet was unknown to the North American Indians?" The total absence of any ivory implements from prehistoric Indian graves appears, however, to be a fairly strong argument against the late existence of the mastodon in the region inhabited by the Indians.

This skeleton is that of a fully developed adult individual, and the teeth, showing but slight signs of wear, indicate that the animal, probably a male, was in the prime of life at the time of its death. In size this Connecticut skeleton occupies a place midway between that of the Warren mastodon, which is larger, and that of the Otisville specimen, mounted at Yale. The single tusk that was recovered has a greatest circumference of 23 in., and is 8 ft. 10 in. long, measured at the curve, the length between perpendiculars being 6 ft. 3 in.*

Remains of a mastodon found in 1705 on the Hudson River thirty miles south of Albany were supposed by Governor Dudley and the learned Cotton Mather to be the remains of the giants or Nephelim of the antediluvian world.† Subsequently, in 1740, the French explorers in making their way down the Ohio River discovered numerous bones and teeth of the mastodon and other animals at the Great Salt Lick near Louisville. Some of these were sent to Paris and so brought to the notice of European scientists. During the nineteenth century many skeletons were disinterred, chiefly from the peat bogs of Orange County, New York; the most notable of these is the Warren mastodon described in a

*Note by Prof. Richard S. Lull to article previously cited.

†This paragraph has been contributed by Dr. W. B. Matthew.

long memoir by Dr. J. C. Warren of Boston,* and now in the American Museum of Natural History. Another noted locality is near St. Louis, Missouri, whence came a fine skeleton now in the British Museum; and in more recent years numerous skeletons, skulls, and teeth have been discovered in the draining of swamps and peat bogs in Ohio, Indiana, Illinois, Michigan, Iowa, and other States. Practically all these finds are in post-glacial deposits, and the absence of mastodon remains in the northern New England States and eastern Canada is perhaps explained on the supposition that these regions were still buried in glacial ice at the time of the final extinction of the mastodon and mammoth.

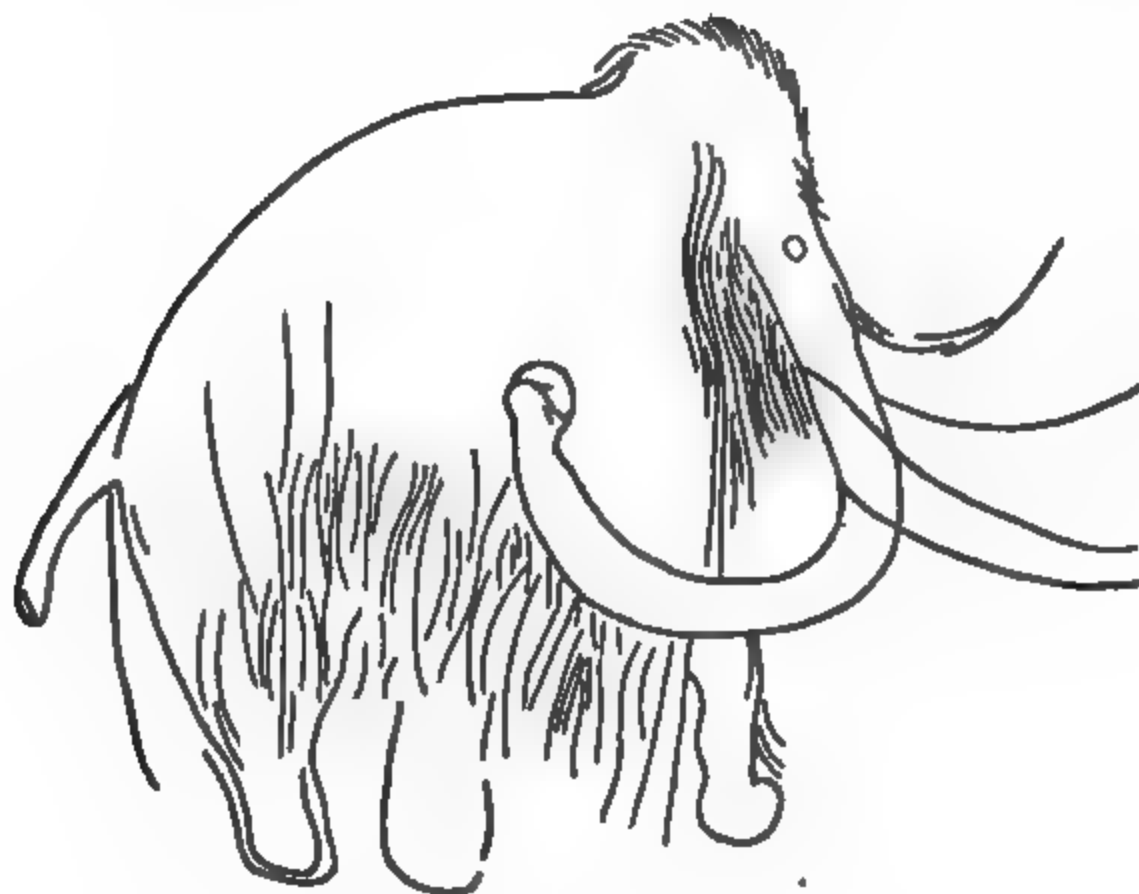
Recently the fossil deposits of Nebraska have supplied a great wealth of specimens illustrating the development of mastodon and mammoth in North America. It is said that this State can boast of nearly two hundred miles of mastodon beds, extending from Knox County to Sioux County. The great variety of forms represented is shown by the fact that six species of mastodons and four species of mammoths are represented. One exceptionally fine mastodon skeleton was discovered in Cherry County, and this is perhaps the finest fossil mastodon in the world.†

In the development of the elephant from its ancestral types, the evolution of the proboscis has followed the lengthening of the tusks. In the very earliest forms, such as the *Moeritherium* for instance, tusks and proboscis are only beginning to exhibit the characteristics peculiar to the Proboscidea, but in later forms, when the tusks—in this stage four in number, two in the upper and two in the lower

*J. C. Warren, 1885, "Description of a Skeleton of the Mastodon Giganteus of North America."

†Erwin H. Barbour, "Prehistoric Elephants in the Morrill Collections, the Nebraska State Museum and the University of Nebraska," *Sunday State Journal*, Omaha, January 3, 1915.

jaw—became more prominent, they progressively interfered more and more with the animals' feeding, rendering it necessary to depend increasingly upon the prehensile power of the trunk. Thus in the lapse of generations and through the successive form-modifications, as the tusks grow longer and more ponderous, so does the trunk lengthen and



MAMMOTH etched on the rock of the "Grotte des Combarelles," dept, Dordogne, France, the outlines being coloured with oxide of manganese.
—From R. S. Lull, "Evolution of the Elephant."

gain in vigour. An anatomical change dependent upon the excessive growth of the tusks is a lengthening of the jaw-bone, very noticeable in the Trilophodons and still present in the immediate predecessors of the Dibelodons, where the tusks of the lower jaw, with few exceptions, have already ceased to assume a tusk form. The teeth of the earliest ancestors of the mastodon were exceedingly simple in form, having but two transverse ridges; in later forms the number

of these ridges increased to three and then to four, until in those of the *Mammot americanum* we have five such ridges. Later still in the chain of development, the teeth of the Stegodons offer from six to eight ridges. In the successive elephant forms the multiplication of these ridges becomes more and more noticeable. While in mammoth remains recently discovered in Crete, Saline County, Nebraska (named *Elephas hayi*) there are ten ridges, the teeth of *Elephas imperator* show eighteen, those of *Elephas columbi* from twenty-four to twenty-six, and those of the so-called "Hairy Mammoth" as many as twenty-eight ridges. The peculiar growth of the teeth in the elephant to which we allude elsewhere is not characteristic of the very early ancestral forms. In the ancestral proboscidiens the teeth come up much as they do in other ungulates. The milk premolars appear first, and then the molars come up in succession behind them, permanent premolars pushing up beneath the milk premolars as these wear down and drop out. In the later types, with the shortening of the jaw the premolars disappear, true molars pressing forward as they come up, and successively replacing the teeth in front of them as these wear down and fall out. Another interesting change was in progress. The earlier teeth lacked cement, but in the later mastodons a little began to appear. In all of the mammoths the teeth are encased in and reinforced by a heavy outer layer of cement.

Some mammoth bones of quite exceptional size have been unearthed at Reynolds, Jefferson County, Nebraska. The great thigh bone measures $5\frac{1}{2}$ ft. in length, indicating that this mammoth was perhaps the largest one so far discovered.*

*Erwin H. Barbour, "Prehistoric Elephants in the Morrill Collections, the Nebraska State Museum and the University of Nebraska," in *Sunday State Journal*, Omaha, January 3, 1915.

NEBRASKA PROBOSCIDEANS*

Irrespective of the merits in the case, gigantic animals make a far stronger popular appeal than small ones. It is believed that no fossil mammals are as universally known as the huge Proboscidea. They were the most ponderous of all land animals and they possessed that unique and highly specialized organ, the proboscis. They fire the imagination and attract universal attention until the names Mastodon and Mammoth are used in common parlance.

Though considered rare, they are common and widely distributed, and in Nebraska are found everywhere. This is especially true of the early mastodons, for their remains occur in the Pliocene along the northern border of the State from Knox County to Sioux, a distance of 250 to 300 miles. Could this broad area be divested of sod and soil, and subjected to excessive erosion like the bad lands, mastodon remains would be exposed in numbers passing comprehension. It is doubtful if any similar area could show so many or such varied kinds. The rocks of the State are deeply covered by soil, accordingly the collecting grounds are restricted chiefly to ravines, bluffs, valleys, and canyon walls. Mastodon teeth and bones are often struck in digging post holes and in drilling wells. Although their bones and teeth are common objects and very abundant, they are but the scattered remnants of former hosts.

Scarcely thirty years ago writers declared that the intermediate proboscideans were lost, and the phylogeny of the order absolutely unknown, but now the genealogy of the elephant promises to be as definitely determined as that of the horse. It is a safe prediction that when the mastodon

*These interesting and valuable details regarding the fossil remains of Proboscideans in Nebraska have been contributed by Erwin Hinckley Barbour, State Geologist of Nebraska and Director of the State Museum of Natural History.

beds of Nebraska are fully explored and studied, they are destined to furnish satisfactory solutions to many of the problems relating to the Proboscidea, and it is certain that many new forms will be added to the list.

Of all the creatures which have lived, but a moiety has been preserved. After a few years not a vestige remains of those skeletons which bleach in the open, while the few dropped in mud and water may become buried and mineralized. Associated with the elephant bones are the remains of such contemporaneous creatures as the rhinoceros, camel, early horse, giant hogs, deer, and countless smaller forms. Great predatory beasts, such as the sabre-toothed cats and huge dogs, were their natural enemies. The climate was favourable, and vegetation must have been luxuriant. Quantities of petrified wood bear evidence of the forest vegetation of the time.

ENTOMBMENT

During the mastodon age in Nebraska, deep river and lake conditions prevailed. The rivers which flowed in ever-varying channels deposited gravels over broad areas. There were wide meanders, lagoons, and marshes, and large lakes and ponds. At flood time enormous amounts of sand, gravel, and mud were spread over the country. In periods of drought this could be assorted more or less by wind. For this reason we often find aqueous and aeolian deposits alternating.

Herds of tropical animals frequented the water courses and the rich vegetation bordering the lakes and lagoons. Many of them perished in the water or were subsequently swept in by freshets. Buoyed by gases of decay, their carcasses floated until deflected into some cove by wind or water currents. They became stranded here, and their skeletons were finally deeply buried in sand and mud.

Some of these four-tuskers, impelled by hunger or thirst, probably ventured too far on quicksands and became engulfed, while others in traversing boggy ground became mired. In these cases, the skeletons are apt to be complete and the bones without scars or blemishes. A few perished on dry ground and became buried by wind-borne dust and sand, but the great majority died on the uplands where their skeletons weathered to pieces and are lost forever.

Beds containing the remains of these animals are found from Wyoming to northeastern Nebraska. After a long period of time a series of beds, several hundred feet in thickness, were deposited, and through out these occur the scattered remains of elephants and associated animals. Occasionally there are actual bone heaps and bone beds. It is apparent then that wherever the overlying material is swept away by wind or water, bones are apt to be laid bare on the surface. Nebraska has been the favourite collecting ground for all of the educational institutions of America and even of Europe.

The degree of preservation varies widely, but in general elephant bones found in the older beds tend to be hard and enduring, while those of the later beds are apt to be weak and perishable. In the older beds sufficient time has lapsed for the infiltration of mineral salts to give stoniness to the bone, while in the more recent beds there has not been time for this process.

METHODS OF COLLECTING

In hunting for the ancient tuskers, the pick and shovel are substituted for the gun, and the sport is not as dry as fossil bones may indicate. Scattered fragments of bone on a talus slope constitute a "lead" which is carefully followed to its source, and here the work of excavation begins. As soon as the rocky matrix is removed from a few square

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inches of bone, the surface is soaked with thin shellac. When dry this imparts surprising hardness. The surface is then covered with strips of shellacked rice paper, or with strong paper or cloth dipped in plaster of Paris. This sets at once and a fresh surface is exposed and treated in a like manner. The whole is then "cinched" or bound with strips of gunny sack dipped in plaster of Paris. This stony covering is so protective that bones may be shipped in entire safety to the laboratory.

The tusks of early mastodons are instantly recognized by a longitudinal band of enamel. This band, about 1 to 2 in. broad in the earlier Nebraska mastodons, began to decrease in width until it was scarcely a quarter of an inch wide in *Tetrabelodon willistoni*. In *Eubelodon morrilli* and *Mammut americanum* it had disappeared altogether. It is said, however, that a bit of enamel still persists as an interesting vestige on the tips of the young of living elephants, but this is soon worn off.

In all fossil tusks the structure and decussations are like that of modern ivory. Sometimes the tusks are as pure and white as ivory itself, but do not possess its strength. Due to mineralization, they may be hard, and occasionally dark in colour, though generally gray. In rare instances tusks are silicified. In one instance a portion of a mammoth tusk from Brown County was converted into that variety of mineral known as odontolite, or "bone turquoise." Three beautiful gems were cut from this material.

As compared with living elephants, the early Nebraska mastodons had proportionally longer bodies and necks, but noticeably shorter limbs. Their successors, the mammoths, had compact, short bodies and necks, and long pillar-like limbs. The most striking difference between our early and late Nebraska elephants lies in the long skulls and jaws of the former and the short skulls and jaws of the latter.

Exclusive of a number of forms supposedly new, the better-known, described representatives of the Proboscidea in Nebraska are *Tetrabelodon willistoni*, *T. productus*, *T. lulli*, *T. campester*, *T. euhypodon*, *Eubelodon morrilli*, *Mammut americanum*, *M. mirificum*, *Elephas hayi*, *E. imperator*, *E. columbi*, and *E. primigenius*.

The material in the State Museum at the University of Nebraska, on which these data are based, belong to the palæontological collections of the Hon. Charles H. Morrill.

The famous mastodon skeleton, known as the "Warren Mastodon," was discovered in the summer of 1845 in a small valley near Newburg, New York. The remains were found buried in a shellmarl layer, and a noteworthy circumstance was that the bones, instead of being black, had the brown hue of a recent human skeleton that has been constantly handled. After having been exhibited for a short time in New York City and also in several New England towns, the skeleton was bought by John Collins Warren, M. D., who was professor of anatomy in Harvard University from 1815 to 1847. It was mounted in Boston, in 1846, by Mr. N. B. Shurtleff, under Professor Warren's direction; in 1849 it was remounted and was placed in a fireproof building in Chestnut Street, Boston, later known as "The Warren Museum." Here the skeleton remained until 1906, when it as well as the other objects constituting the Warren Collection were acquired by the late Mr. J. Pierpont Morgan, and donated by him to the American Museum of Natural History, New York City. Professor Warren published, in 1855, a monograph treating of this remarkable specimen under the title: "The Mastodon Giganteus of North America."

After its reception in the Museum the skeleton was remounted and renewed, being completely disarticulated in the course of this work, the separate bones being immersed

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in alcohol to remove the coating of dark varnish with which they had been covered, thus restoring the hue they had when unearthed.

The following are the detailed measurements of the remarkable specimen of the American mastodon:

Length, base of tusks to drop of tail	14 ft. 11 in.
Height to top of spine at back at the shoulders	9 ft. 2 in.
Tusks: length of right tusk in outside curve	8 ft. 6 in.
length of tusk exposed	7 ft.
Thigh bones: length of right	3 ft. 5 in.
length of left	3 ft. 6½ in.
Pelvis, or innominate bones, width of	6 ft.

Within the territorial limits of New York State a very considerable number of mastodon remains have been discovered at various times. One of the most important of these finds was made at Cohoes, New York, in September, 1866, in the course of excavations for the foundations of a mill.* At a depth of twenty-five feet below the surface the workmen came upon the lower jaw of a mastodon and a single bone of the animal's foot; these rested upon a rock projection between two depressions or concave walls of small pot-holes at the margin of a larger pot-hole. The excavation resulted in the removal of a mass of earth and clay which had been filled in at some former time to cover a swampy depression of considerable extent. The discovery of the jawbone and the other single bone suggested the probability that further digging would reveal the presence of an entire skeleton, and the peaty earth and fragments of trees were removed from the deepest part of the pot-hole, where the remains would most likely be found. This conjecture proved to be correct, for at the bottom,

*James Hall, "Notes and Observations on the Cohoes Mastodon"; Twenty-first Annual Report of the Regents of the University of New York; appendix, pp. 99-148.

upon a bed of clay, broken slate, gravel, and water-worn pebbles, reposed a nearly complete mastodon skeleton to which the bones already found had belonged. Some other missing bones were later on unearthed in another neighbouring pot-hole.

In this case, as in others where mastodon remains have been found in or at the bottom of peat bogs or swamps, Professor Hall rejected the idea that they had been entrapped there by wandering over the surface in search of food, as in many cases extensive swamps are more treacherous at the edges than farther in, and large and heavy animals are usually extremely cautious about the sustaining power of the ground on which they tread. Hence he was disposed to reject a comparatively late date for the American mastodon, and believed that the remains had been drifted into their present location during the Glacial Period. Of this he wrote:*

“At the close of the Glacial Period or at any time during its continuance, the thawing of the ice would release any objects frozen into the mass, and these would be dropped upon the surface, or promiscuously distributed. If, by some means, the body of a mastodon had become imbedded in the accumulating glacier, the expansion and contraction of the ice, the cracking and filling of these cracks with water and its subsequent freezing, all these combined together might dismember the bones in the remarkable manner before indicated, causing a separation of attached or adjacent portions in a way that no other means could accomplish. Thus, while the bones constituting the greater part of the skeleton remained in close proximity, and were deposited in the deep pot-hole as found, other portions which had been abruptly separated by the expansion due to freezing and thawing were deposited in other places more or less distant.”

*Op. cit., p. 106.

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The principal dimensions of the Cohoes Mastodon as mounted are given as follows:*

Length in a direct line	14 ft. 3 in.
Length following curve of spinal column	20 ft. 6 in.
Elevation of the crest of the scapula	8 ft. 4 in.
Elevation of the crest of the pelvis	8 ft. 4 in.
Elevation of the head	8 ft. 11 in.

In height the Cohoes specimen is 10 per cent. less than the Warren mastodon, and hence when living the heights would have been about 9½ and 10½ ft. at the shoulders, respectively.

The mastodon (*Mammot americanum* Kerr) found in a swamp at Otisville, New York, in 1871, and now in the Peabody Museum, Cambridge, Massachusetts, is one of the most perfect specimens of its kind in the United States. It has a height of 8 ft. 3 in. at the shoulder; from socket of tusk to end of tail is 13 ft. 2 in. There are, however, no tusks.

The magnificent skeleton of the true mammoth, *Elephas primigenius*, now to be seen in the American Museum of Natural History, New York City, is a typical example of this species of extinct elephant, the habitat of which in pre-glacial and glacial times extended over the greater part of North America. These remains were found in 1904 on the Gift farm, near Jonesboro, Indiana, embedded in a peaty deposit, believed to be of the Middle Pleistocene Age; they lay eight feet below the surface. When first uncovered the tusks were in a perfect state of preservation, but were slightly damaged in the work of removal. The skeleton lacked the tail bones as well as those of the feet and of the lower limbs, excepting the left tibia. Restoration of this and of some parts of the skull, of the bony surfaces, and of the tusks had to be made.

*Op. cit., p. 122.



MANDIBLE OF TETRABELODON LULLI

FOUND IN DEPOSITS AT SNAKE RIVER, CHERRY COUNTY, NEBRASKA, IN 1914. CROWN VIEW, 1:10 NATURAL SIZE; THE PORTION IN FRONT OF THE DOTTED LINE IS RESTORED. COLLECTION OF HON. CHARLES H. MORRILL. FRONT AND SIDE VIEWS. FROM NEBRASKA GEOLOGICAL SURVEY, VOL. IV.

COURTESY OF DR. ERWIN H. BARBOUR, STATE GEOLOGIST OF NEBRASKA



MOUNTED SKELETON OF THE MAMMOTH (*ELEPHAS PRIMIGENIUS*)

IT WAS FOUND EMBEDDED IN A MUCK DEPOSIT OF LATE PLEISTOCENE AGE, FIFTEEN FEET BELOW THE SURFACE, NEAR JONESBORO, GRANT COUNTY, INDIANA, IN 1903. LENGTH FROM INCURVED TIP OF TUSKS TO VERTICAL LINE OF TAIL, 17 FEET 9½ INCHES; FROM BASE OF TUSKS, 13 FEET 3½ INCHES. HEIGHT AT WITHERS (TO TOP OF SCAPULA), 10 FEET 6 INCHES. LENGTH OF RIGHT TUSK (OUTSIDE CURVE), 11 FEET 4½ INCHES. NOW IN THE AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK.

FROM BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY, VOL. XXIII

The pose of the skeleton suggests that of an animal with uplifted head on the point of walking forward. The form of the tusks is of great interest as they are completely incurved and crossed, and thus appear to have been of little or no use either as tools or as weapons. The back and body seem relatively short when compared with the height. The measurements are as follows:

Base of tusks to drop of tail	13 ft. 3½ in.
Length of right tusk, outside curve	11 ft. 4½ in.
Height at the shoulders	10 ft. 6 in.
Length of thigh bone or femur	4 ft. 1¼ in.
Width across pelvis	4 ft. 10 in.

One of the finest mammoth skeletons in the United States is in the collection of the Field Museum of Natural History in Chicago, having belonged formerly to the Chicago Academy of Sciences. This skeleton was found in 1878 in Spokane County, Washington, and is remarkable both for its excellent state of preservation and for its great dimensions. The species is the characteristic American type *Elephas columbi*.*

Several remains of the Irish mammoth are preserved in the National Museum at Dublin. The more important of these are a tusk dredged out of Waterford Harbour; a molar from marine gravels, County Antrim; portions of a skeleton from Shandon Cave, County Waterford; and a number of parts of skeletons from Doneraile Cave, County Cork. There is also the molar of an Irish mastodon, believed to have been dredged off the coast of Antrim. Several molars of the English mammoth may be viewed in this Museum, one from Aylesford, Kent, another from

*Field Museum of Natural History, Publication 181. Report Series Vol. IV, No. 1. Annual Report of the Director to the Board of Trustees for the year 1914, Chicago, 1915, p. 382, Pl. IX.

Kents Hole Cave, Devonshire, and a third from Robin Hood Cave, Cresswell Crag.*

It will be of interest to show here one of the fourteen representations of the mammoth scratched or engraved on the walls of the "Grotte des Combarelles" (Dept. Dordogne), France, all of which, as has been noted in the first chapter of this work, had the effect of their outlines heightened by the use of oxide of manganese.†

It is not only in the prehistoric cave dwellings of France that graphic representations of the extinct European elephants have been found, but in Spain also examples of at least equal interest and value have been discovered. One of the best of these is a tracing, in a reddish colour, on the right wall of the cavern of Pindal, in the Asturias, discovered by Alcalde del Rio in April, 1908. This outline drawing is singularly successful in presenting the chief characteristics of the great pachyderm. The animal is depicted in repose, the trunk hanging down vertically, with a slight curve at the tip; only one tusk is indicated, by a single stroke. A heart-shaped red mark toward the middle of the body is supposed to indicate an immense ear flap. An especially notable circumstance in connection with this effective drawing by prehistoric man is that the shortness of the tusk in comparison with the length of the trunk, the lack of any indication of a hairy covering, and several other signs point to a type differing greatly from that figured in the French cave dwellings of the Dordogne, a type more closely approaching that of living elephant species than did the *Elephas primigenius*. Another red tracing of a mammoth was found on the wall of the Castillo cavern, at Puento Viesgo, Spain, discovered by Alcalde del Rio, Novem-

*Communicated by Dr. R. Scharff, National Museum, Dublin, Ireland.

†Richard S. Lull, "The Evolution of the Elephant," pp. 15, 17. Peabody Museum of Natural History. Guide No. 2. See figure on p. 367 of present work.

ber 8, 1903. The figure is only traced in silhouette, eye and ear are lacking and only a single foreleg and hindleg are drawn.* The tusk indicated by a short stroke and the absence of any mane, there being only markings indicating a few stiff hairs along the spine, combine to prove that we have here essentially the same type as that figured on the cave wall of Pindal. This confirms the conjecture that the mammoths both draughtsmen were striving to figure were very different in appearance from those which served as models for the prehistoric artists of the Dordogne caverns.†

In the southern part of the department of Oran, Algeria, there have been found engraved on the face of rocks by natives of the land a certain number of elephant figures. These representations are believed to be of great antiquity, and some of them may possibly date back to the early period of the cave dwellers of the Dordogne. A curious example of the North African rock sculptures shows five somewhat grotesque elephant figures, engraved and polished, two bulls and two cows, accompanied by some human figures, these being placed as though to give, by contrast, an adequate idea of the immense size of the quadrupeds. This sculpture is on a rock between Ouedj and Tathania in Southern Oran.‡ Here the cows appear to be without tusks, those of the bulls being very short. The same holds good of another similar rock sculpture from the same region.** Whether it would be safe to draw any morphological conclusions from the rude figures of these primitive artists appears very doubtful.

*H. Alcalde del Rio, Abbé Henri Breuil, and Rev. Father Lorenzo Sierra, "Les Cavernes de la Région Cantabrique (Espagne)," "Peintures et Gravures Murales des Cavernes Paléolithiques," Monaco, 1911; published under the auspices of H. S. H. Prince Albert I of Monaco. See pp. 61, 66, and Pl. XLIV and XLV.

†Op. cit., p. 129; see Fig. 117, p. 131, and Pl. LXVIII.

‡"Les Cavernes de la Région Cantabrique (Espagne)," by H. Alcalde del Rio, Abbé Henri Breuil and the Rev. Father Lorenzo Sierra. Monaco, 1911; published under the auspices of H. S. H. Prince Albert of Monaco. See p. 239, Fig. 246.

**Op. cit., Fig. 247, p. 240.

Remains of *Mastodon andium* have been found in a sediment of argillaceous schist at the foot of the higher of the two limestone elevations called Los Morros de San Juan, near Villa de Cura, Venezuela. The discovery was made in the course of excavations undertaken to enlarge the hydro-sulphuric springs here, known and used from the time of the Spanish Conquest, and still annually visited by many bathers. The mastodon relics are now preserved in the Museo Nacional of Caracas, and are as follows: one molar tooth, one calcaneum, a femur, a fragment of a tibia, one hopelessly fractured tusk, fragments of an omoplate, a few ribs, and some smaller bones. The crown of the molar is 13 cm. long and 8 cm. broad; it measures 35 cm. in circumference at the base and has roots 9 cm. long; it may be referred to the genus *Trilophodon*, Falconer. Most of the bones have a greenish-gray hue like that of the gravel wherein they were deposited; only the larger bones, the tibia and femur, are of darker shade, almost brown, and the interior presents the whiteness of a new bone. The femur, 65 cm. long, and the tibia, are fairly well preserved, and are solid as are those of the elephant. The tusk, originally more than a metre long, has a circumference of 39 cm.; unfortunately it is so extensively fractured that restoration is impossible. As with elephant tusks, it is made up of several concentric layers of ivory; but from having lain buried for so many centuries in a deposit not containing petrifying constituents, it has suffered from dry rot. The general characteristics of the remains indicate that the mastodon of San Juan was an adult animal some 3 metres (nearly 10 ft.) in extreme length and having a height of about $2\frac{1}{2}$ metres (8.2 ft.).*

Fossil remains of proboscideans have been found in many

*Communicated by Señor Francisco de P. Álamo, naturalist, of Caracas, Venezuela, in January, 1914.

parts of South America, especially along the western side, from Colombia to Argentina.* So far as is known they are all of Pleistocene or late Pliocene age, and more or less nearly related to the Miocene and Pliocene genera of North America. Mammoths and elephants appear rarely, if ever, to have penetrated into South America; nor apparently did *M. americanus* ever reach that country. Early discoveries sent to Europe were described under the names of *Mastodon humboldti* and *M. andium*, and thought to be related to *Mastodon*, now *Trilophodon*, *angustidens* of Europe. Later discoveries† show that there were several different types in South America, but probably all of them may be referred to the genus *Dibelodon* (= *Stegomastodon*).

The only species of Elephantidæ, remains of which have been found in Uruguay, South America, is the *Mastodon Humboldti* (Cuvier), bones of which have been discovered at Mercedes in Uruguay, situated on the Rio Negro, about fifteen miles from its entrance into the Rio de la Plata. The mammoth is unknown in South America, but of the species *Elephas columbi* (Falconer) remains are said to have been found in Colombia, and they also appear in Mexico.‡

There appears to be some evidence that the ivory capping of a mastodon molar was found in 1880 in Mexico, as in that year the Jefe Politico of Progreso, Yucatan, Mexico, showed such an object to Dr. Edward H. Thompson as having been given to him during a recent visit to Vera Cruz. However, no definite information was obtainable as to the exact locality from which the tooth fragment had been brought, so that it was not possible to make a search for

*Communicated by Dr. W. B. Matthew.

†Florentino Ameghino, 1889, "Mamíferos Fósiles de la Republica Argentina," *Actas Acad. Nacional "Ciencias"* Cordoba, Vol. VI, pp. 632-652.

‡Communicated by M. A. Lamme, Director of the Instituto de Geología y Perforaciones, Montevideo, Uruguay, S. A.

further remains. An exceptionally large number of remains of extinct Proboscidea were found in Mexico at the time of the digging of the canal to drain Lake Tezcoco near Mexico City, and are preserved in the Instituto Geologico in that city.

During his travels in the Brazilian province of Minas Geraes in 1817, the French botanist, Auguste de St. Hilaire, was shown, at Villa do Fanado, the tooth of a mastodon, now in the Muséum d'Histoire Naturelle in Paris, which was said to have been found in a saltpetre tract of the desert region of the province. He recalls somewhat indistinctly a statement that bones of unusual size had been unearthed in this region.*

That the peculiar form of the elephant's skull is due to an evolutionary process connected with and conditioned by the development of the trunk and the tusks, has already been quite fully explained and illustrated in the present chapter. To sustain the weight of this strange appendage and afford the requisite leverage, the skull has gradually become shortened and its height increased. This characteristic form lends to the elephant a certain appearance of dignity, and is suggestive of a high degree of intelligence. However, the animal's brain, though highly convoluted, is of relatively small size, the thickness of the roof of the skull exceeding the height of the brain case. The delicate prehensile power of the trunk, so striking in view of its enormous strength, is due to the fingerlike projections with which it terminates, these constituting a notable element of distinction between the Indian and the African types, but one such projection being present in the case of the former, while the trunk of the African elephant is provided with two of them.†

The possible influence exerted by the elephant's pre-

*Auguste de St. Hilaire, "Voyage dans les Provinces de Rio de Janeiro et de Minas Geraes," Paris, 1830, Vol. II, p. 314.

†Richard S. Lull, Ph. D., "The Evolution of the Elephant," p. 31. Peabody Museum of Natural History, Guide No. 2. Reprinted from *Am. Jour. Sc.* Vol. XXV, March, 1908.

hensile trunk upon the development of this animal's intelligence, which is of a high order in some directions, has been adduced by Prof. Richard S. Lull, who notes that the elephant shares to a limited extent with man in the ability to handle objects easily and delicately, and to bring them before the face for examination.*

Fossil remains of extinct species of elephants have been found in various parts of Japan, in deposits of Miocene age, and all the way up to those of Pleistocene age. So far four or five distinct species have been determined.†

It was not until 1900 that a systematic attempt was made to distinguish and describe the different varieties of the *Elephas africanus*. In that year Dr. Matschie, Curator of the Zoölogical Museum in Berlin, indicated four of these varieties, namely:

Elephas a. capensis, CUV.

El. a. cyclotis, MATSCHIE.

El. a. Knochenhaueri, MATSCHIE.

El. a. oxyotis, MATSCHIE.

In 1906 Noack described a new sub-species of dwarf elephant, *El. a. pumilio*. Finally, in 1908, Lydekker, basing his distinctions chiefly upon the form and relative dimensions of the ear, named the following thirteen sub-species of the *Elephas africanus* BLUM.:‡

E. a. capensis CUV.

Eastern part of South Africa.
(Port Elizabeth, where it is protected).

E. a. oxyotis LYD.

Western part of South Africa.
(Near Mossel Bay, where it is protected).

*Ibid., p. 8.

†Communicated by Kinosuke Inouye, Director of the Imperial Geological Survey of Japan.

‡Schouteden, "L'éléphant nain du Congo"; in *Revue Zoölogique Africaine*, Vol. I, Fasc. 2, pp. 222-229, Pl. XII, XIII; Bruxelles, August 31, 1911.

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<i>E. a. Selousi</i> LYD.	Mashonaland and Matabeleland.
<i>E. a. cyclotis</i> MATSCHIE.	Cameroons.
<i>E. a. Cottoni</i> LYD.	Congo.
<i>E. a. Knochenhaueri</i> MATSCHIE	German East Africa, Northeastern Rhodesia.
<i>E. a. Peeli</i> LYD.	English East Africa.
<i>E. a. Cavendishi</i> LYD.	Lake Rudolf (Northeastern Africa) Gallaland, Lado (?).
<i>E. a. oxyotis</i> MATSCHIE.	Abyssinia, Sudan, Blue Nile.
<i>E. a. Orleansi</i> LYD.	Northern Somaliland.
<i>E. a. Rotschildi</i> LYD.	Western Sudan.
<i>E. a. albertensis</i> LYD.	Uganda.
<i>E. a. pumilio</i> NOACK.	French Congo.

Although but two of these types have so far been definitely noted in the Congo basin (*El. a. Cottoni* and *El. a. pumilio*), Dr. Schouteden considers it highly probable that some other of these varieties exist there. The unique specimen of the dwarf elephant, *El. a. pumilio*, was acquired in 1905 by the New York Zoölogical Society. While Noack, who examined the animal in Europe in 1905, believed it was about six years old at that time, the New York experts placed its age at from two to three years. The following data given by Dr. Hornaday, of the Zoölogical Society, show the slow growth and development of this most interesting specimen, which is known to visitors as "Congo":

DATE		HEIGHT			WEIGHT	
July	28, 1905	.	.	.	3 ft. 8 in.	600 pounds
March	23, 1907	.	.	.	3 ft. 10½ in.	
November	1, 1908	.	.	.	4 ft. 6½ in.	1,170 "
January	4, 1910	.	.	.	4 ft. 9½ in.	
June	7, 1911	.	.	.	5 ft.	1,650 "
July	11, 1911	.	.	.	5 ft.	1,700 "

The tusks are now reported 22 and 23 in. in length, while they were little over 4 in. long in 1905.



PIGMY ELEPHANT "CONGO" (*Elephas pumilus*)

AGED 11 YEARS, HEIGHT 3 FEET, WEIGHT 1,050 POUNDS

NEW YORK ZOOLOGICAL SOCIETY

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In his book "Ins innerste Afrika," which appeared in 1909, Duke Adolph of Mecklenberg describes the finding of the skeleton of a dwarf elephant in the territory of the Wambutti, near Beni, Belgian Congo;* the specimen in New York is said to have come from the French Congo. The dwarf elephant has been regarded by some as possibly representing the fossil pygmy elephants of Cyprus and Malta.†

The dense jungles near the shores of an inland sea stretching from Nakawa to Singora, in Siam, constitute the habitat of a species of small "red elephant," so named because of the reddish-brown hue of the sparse hair covering their bodies. They are tuskless, and as no attempt has been made until quite recently to tame them, they are the only elephants in Siam unprotected by the stringent regulations of that country against shooting these animals.

NAMES OF THE ELEPHANT AND OF IVORY IN VARIOUS LANGUAGES

LANGUAGE	ELEPHANT	IVORY
English	Elephant	Ivory
Anglo-Saxon	Elpend	Elpenbaenen
German	Elephant	Elfenbein
Dutch	Olifant	Ivoor, elpenbeen
Danish	Elefant	Elfenben
Swedish	Elefant	Elfenben
Lettish	Elefants, silons	Elefanta sohbs
Lithuanian	Slanas	Slanio kaulas
French	Éléphant	Ivoire
Italian	Elefante	Avorio
Spanish	Elefante	Marfil
Portuguese	Elephante	Marfim
Rumanian	Elefant	Fildes

*Dr. Schouteden in *Rev. Zool. Afr.*, Vol. Fasc. 2, p. 287.

†Richard Lydekker, in "Encyclopedia Britannica," 11th ed., Cambridge, 1910; article, *elephant*.

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NAMES OF THE ELEPHANT AND OF IVORY IN VARIOUS LANGUAGES—*Continued.*

LANGUAGE	ELEPHANT	IVORY
Russian	Slon	Slonovaya kost
Polish	Slon	Sloniova kość
Bohemian	Slon	Slonovina, slonová kost
Bulgarian	Fil	Slonova kost
Servian	Slon	Phildish
Ruthenian	Slon	Sloneva kist
Hungarian	Elephánt	Elefantesont
Irish	Trod	Iomhog
Welsh	Elifant	Asgwrn eliffent
Lapp	Elefanta	
Japanese	Zo, Kisa	Zoge
Chinese	Siang	Siang
Siamese	Chang	Nga Chang
Burmese	Htsin	Htsin-tsive
Sanskrit*	Gaja, ibha	Gajadanta; hastidanta
Greek	Ἐλέφας	Ἐλέφας; ἐλεφάντινος (adj.)
Modern Greek	Ἐλέφας	Ἐλεφαντόδοντον
Latin	Elephas	Ebur
Arabic	Fil	ʿĀjadhan
Persian	Pil	
Turkish	Fil	Fil-dishi
Sumerian	AM-SI(?)	KA-AM-SI
Assyrian	Piru	Shinni piri

*The elephant is also called *hastin*, literally the animal "having a hand."

CHAPTER XI

ELEPHANT TUSKS

THE story of the slow and gradual evolution of mammoth and elephant from the earliest stages naturally leads up to a more special presentment of the facts regarding their wonderful tusks, at once the pride and the bane of these last survivors of the monsters of far-off times. Indeed, it may be said that the importance of the elephant in our day results almost exclusively from the utilization of ivory in the arts and industries. Still, it is well to remember that these marvellously developed teeth have been evolved in harmony with the general structural development of the elephant. The progressive change in the length of the tusks conditioned a reciprocal change in the form of the skull. Each stage of the individual development represents the results of an effort to establish an equilibrium between skull and tusks, this equilibrium being progressively disturbed by a lengthening of the tusks and again reestablished by a corresponding change in the skull. This reciprocal process of growth continues at least up to the full maturity of the individual elephant. What is true of the individual must also have been true of the successive stages in the development of the various elephant species, the changes here taking place, however, with less regularity and with occasional periods of interruption, although the principle and cause are the same.*

*W. Soergel, "Die Stammesgeschichte der Elephanten," *Centralblatt für Mineralogie, Geologie and Paläontologie*, 1915, No. 7, April 1st; Stuttgart, 1915, pp. 208, 209.

The great development of the tusks in the immediate predecessors of the Indian elephant, strictly so-called, is shown in the skull and mandible of *Elephas* (*Stegodon*) *Ganesa* (Gaut and Falconer), now in the British Museum of Natural History. This came from the Lower Pliocene formation of the Siwalik Hills, India, and the tusks project 9 ft. 9 in. beyond the sockets.

The lessons in elephant morphology to be learned from a study of the exceptionally well-preserved remains of the Beresovka mammoth, an examination of which has greatly enlarged our knowledge of the probable appearance of the *Elephas primigenius* of the north, have been of great value in the branch of palæontology. No one was in a better position to pursue this study than was one of the zoölogical preparators of the Petrograd Imperial Academy of Sciences, E. V. Pfizenmayer, who was chosen as one of the members of the expedition sent out by the Academy to examine and secure the valuable find.* Unfortunately, owing to the carelessness shown by the original finders of this mammoth in failing to protect the flesh from decomposition, the hairy covering at first to be observed had to a great extent disappeared when Doctor Pfizenmayer first saw the remains. Enough hair was left, however, either attached to the skin, or scattered over the earth about the remains, to enable him to come to the conviction that nothing pointed to the existence of a true mane, although about the neck the hair may have been a trifle longer than on the other parts of the body; its colour must have been a rusty brown. The most interesting results of the investigations of Doctor Pfizenmayer regard the form and setting of the tusks of the northern mammoths. In the case of this specimen from the Bere-

*E. Pfizenmayer, "A contribution to the morphology of the mammoth, *Elephas primigenius* Blumenbach; with an explanation of my attempt at a restoration," trans. from the Transactions of the Petrograd Academy of Sciences, Smithsonian Report for 1906, pp. 321-333; with one plate.

sovka, evidently a young animal, one of the tusks was, as we have noted, attached to the skull at the time the remains were discovered, but it was hacked out by one of the natives not long afterward. However, by careful readjustment, guided by the marks left on skull and tusk by the hatchet used in cutting the latter out, some interesting indications as to the progressive growth and change of direction in the mammoth tusks were secured, and Doctor Pfizenmayer has come to the conviction that in the full-grown animals the direction of curve was not upward nor outward, nor definitely inward, but after first describing a short inward curve the further growth developed a downward curve. In a young mammoth, such as that found on the Beresovka, this final curve is not yet apparent at the lower end of the tusk bending inward. The abraded surfaces to be noted on many mammoth tusks have been explained as due to their use by these animals in digging up their food, grasses, plants, shrubs, etc., out of the snow or ice which covered it during a considerable part of the year in this far northern land.

The downward curve, a prolongation of an inward curve, is most characteristically shown in a mammoth tusk of the Petrograd Zoölogical Museum. This tusk, which is a left one, measures but 98 cm. (3 ft. 2½ in.) on a straight line and yet has a length of 1.59 m. (5 ft. 2¼ in.) if measured along the curve. It has the peculiar spiral curvature to a very marked extent. This is also observable in a most interesting mammoth cranium, with left tusk attached, now in the museum of Cracow University and found in 1851 at Bzianka, near Rzeszov, in West Galicia under the loess. Here the tusk, while measuring almost exactly two meters (6 ft. 6¾ in.) along its curve, has a direct length of only 1.57 cm. (about 5 ft. 1¾ in.); the circumference at the upper end is 30 cm. (11¾ in.). The spiral twisting of this tusk, although

much less than in the tusk at Petrograd already described, is sufficiently marked to confirm the conclusions above detailed. The "restored" tusks of the Adams mammoth in the Petrograd Museum have been made up out of separate pieces and are unquestionably not identical with, or even similar to, those really borne by this mammoth.

Whatever may be the final opinion in regard to the permanent value of these conjectures, they certainly have much to support them, although further and fuller evidence is needed to establish them satisfactorily.

The largest tusks of the existing species of elephants in Asia and Africa are inferior in length to some of those which have been found with other remains of extinct elephant species. Exceptionally fine examples of these tusks are now to be seen in New York; Lincoln, Nebraska; Brünn, Moravia; Los Angeles, California; Mexico City, and also in Paris, Petrograd, and several other European cities, some of the American examples coming from our Alaskan territory.

The tusks of the Württemberg mammoth in the Stuttgart Naturaliencabinett are typical specimens of those borne by *Elephas primigenius*. The curve is remarkable and yet by no means ungraceful. While the left tusk measures 8 ft. 10 $\frac{1}{4}$ in. along the outside curve, the direct line from base to tip is only 4 ft. 5 $\frac{1}{8}$ in., less than half the actual length; the right tusk is 8 ft. 8 $\frac{1}{3}$ in. long, the "chord" being 4 ft. 3 $\frac{1}{8}$ in. The circumferences are 26 in. for the right tusk and 25 $\frac{1}{2}$ in. for the left one. Besides these tusks, forming part of the splendid skeleton set up in this institution, there are two remarkable tusks, also from Steinheim-on-the-Murr, Württemberg, found in 1912. One of these, a left tusk of the *Elephas antiquus*, is almost straight, after an initial downward curve, and measures 12 ft. 3 in. in length; the other, a right tusk of *Elephas primigenius*, has a length along the outside curve of 12 ft. 1 $\frac{3}{8}$ in., but is so sharply curved

that a direct line from tip to base would be less than 4 ft. To emphasize the characteristic difference these tusks have been placed one above the other; the curved tusk describes three quarters of a circle.*

A tusk rivalling in length those of the Instituto Geologico of Mexico City is preserved in the Franzens-Museum at Brünn, Austria. It is stated to measure more than 5 meters in length or approximately 16 ft. 6 in.; this was found in 1845, in the loess of the Sanct Thomas Ziegelei near Brünn, and belonged to an example of *Elephas primigenius*.† As the same slightly indefinite statement as to length is made in regard to the Brünn tusk and to those of Mexico City, it is not possible, in the absence of absolutely accurate data, to determine which is the longest of these extraordinary tusks.

One of the largest mammoth tusks ever discovered in Siberia is in the American Museum of Natural History, New York. It was obtained, by the Jesup Expedition, from the Liakhov Islands. This tusk of *Elephas primigenius* has an outside curve of 12 ft. 11 in., and a basal circumference of 21 in., and weighs 200 pounds. It is almost perfect, excepting a small piece of the tip which has been broken off. From an Alaskan mammoth of the same species the Museum has a pair of round tusks 56 in. in length and 10 in. in circumference. There are also the jaws and teeth and some portions of the skeleton, as well as even pieces of the hide and hair. This specimen came from Elephant Point, Eschscholtz Bay, Alaska.

From the territory of the United States the Museum

*O. W. Dietrich, "Elephas primigenius Fraasi, eine schwäbische Mammutrasse," Stuttgart, 1912, pp. 67, 68, and E. Frasse, "Elefantenzähne von Steinheim a. d. Murr," Reprint from "Jahreshefte d. Vereins für vaterl. Naturkunde in Württemberg," 70th Jahrg., 1914., pp. 34-36.

†Alexander Makowsky, "Der Loess von Brünn und seine Einschlüsse an diluvialen Thieren und Menschen," *Verhandlungen d. naturf. Vereines in Brünn*, Vol. XXVI, p. 219.

possesses a skeleton of *Elephas primigenius*, the American mammoth. This was found near Jonesboro, Indiana, in 1903, and one of its most striking features is the complete incurvature and crossing of the tusks, the longer of which measures 12 ft. 4½ in. along the outside curve, and has a greatest circumference of 22 in. They are considerably infiltrated but still retain much of their resiliency.

The largest mammoth tusks in the collection, and among the largest ever found, are from a specimen of *Elephas imperator*, the Imperial mammoth, from Victoria, Texas, belonging to the late Pleistocene Age. The more nearly complete of the pair measures 13 ft. 6 in. along the outside curve, thus considerably exceeding in length the longest of the elephant tusks of to-day; the greatest circumference is 23 in.* These tusks have completely lost their elasticity. This mammoth has a height of 10 ft. 6 in., while the gigantic skeleton of *Elephas meridionalis* now in the Paris Museum attains a height of 12 ft. 6½ in.† The tusks of the Warren mastodon, found near Newburg, New York, are badly damaged but appear to have measured 8 ft. 6 in. in length.

It is worthy of note that no ivory objects have been found in the tombs or other deposits of the American aborigines, and this may be explained by the probability that, in the territory of the United States at least, the mammoth had passed away before the appearance of man. A number of American archæologists, among them Dr. J. Walter Fewkes, have never observed carved ivory or any kind of mastodon bones among the deposits left by the ancient American Indians.

A famous pair of fossil tusks may be seen in the Petrograd Zoölogical Museum, one of them measuring 12 ft. 9.93

*Personal communication of W. D. Matthew, Curator of the Natural History Museum.

†Henry Fairfield Osborn, "A Mounted Skeleton of the Columbian Mammoth," *Bull. Am. Mus. Nat. Hist.*, Vol XXIII, Art. XII, pp. 255-257; March 30, 1907.



IMPERIAL MAMMOTH (*ELEPHAS IMPERATOR*)

PALATE AND TUSKS FROM VICTORIA, SOUTHERN TEXAS. TOP OF SKULL IS RESTORED IN PLASTER. THESE ARE AMONG THE RECOVERED TUSKS, AND MEASURE 13 FEET 6 INCHES ALONG THE OUTER CURVE.

COURTESY OF DR. ERWIN H. BARBOUR

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in. along the curve, and having a girth of 35.43 in., while the other and longer one attains an extreme length along the curve of 13 ft. 7.78 in., with the same extreme circumference as the shorter one. The weights are respectively 167 and 186 pounds. They were found on the Kolyma River, northeastern Siberia, by the Russian merchant Gromoff, and at the time of their discovery were still attached to the skull of the mammoth. The great curve described by these tusks is shown by the fact that on a straight line they measure respectively 7 ft. 4.58 in. and 6 ft. 11.46 in., the shorter measurement on a straight line being that of the longer of the tusks. They are in perfect condition, showing both the pulp and the tip intact.*

A fossil mammoth tusk of extraordinary size comes from a creek near Kotzebue Sound. It was found by some Eskimos, buried in the frozen tundra, which never thaws. It is said to be 14 ft. long, 9 in. in diameter at the largest end, weighs 165 pounds, and is in perfectly sound condition throughout. It has been pronounced the very best specimen ever discovered. If the reported length be correct this would be probably the longest tusk so far recovered, excepting the imperfect tusks from Rancho La Brea, California, which are supposed to have originally exceeded 15 ft. in length, and the extraordinary specimens in the Instituto Geológico of Mexico City, as well as that in Brünn.

When during the cruise of the revenue marine steamer *Corwin*, in the Arctic Sea in 1885, anchor was cast for a short time at Cape Prince of Wales, Alaska, the natives offered for barter several large tusks and bones of the mammoth. We need not be surprised to learn that the native ideas of the appearance of the extinct mammal were rather wide of the mark. They supposed that it must have re-

*E. Pfizenmayer in Annual Report of the Smithsonian Institution for 1906, p. 328; translation; Washington, 1907.

sembled the reindeer, although of much greater size. A somewhat remarkable find was made at Schismareff Inlet, when the anterior part of a mammoth skull was discovered in which there was no sign of petrification, the bone remaining dry, firm, and light, in spite of the great period of time which must have elapsed since the quadruped's death.*

A few years ago, during the winter of 1908-9, there was discovered at Borna, near Leipzig, the nearly complete skeleton of a mammoth. The remains lay in the lower part of a stratum of quaternary clay, and with them was found a fragment of a reindeer antler. The character of the formation in which the mammoth bones appeared indicated that the animal had met its death by sinking into a marsh or species of quicksand, which it was endeavouring to traverse. The longest of the tusks measured 3.26 meters (10 ft. 6 in.) and has a circumference of 50 cm. (nearly 20 in.) at the base. The height of the mammoth is estimated to have been 3 meters 20 centimeters or nearly 10 ft. 6 in.†

In the alluvial deposits of Tilloux, near Gensac-la-Pallue (dept. Charente), many remains of the extinct European elephant were found in 1894, associated with a number of products of the industry of prehistoric man.‡ Among the elephant relics were two enormous tusks, found almost twenty feet apart from each other. They are but little curved. The line between the two extremities (the "chord") of the better preserved of these tusks measures 2 m. 85 cm., or 9½ ft., while similar measurements of the large Indian tusk in the Paris Museum of Natural History gives but 1 m. 87 cm. (6½ ft.), and a like measurement on a straight line of the Durfort tusk of the extinct *Elephas meridionalis*

* Charles H. Townsend, "Notes on the Natural History and Ethnology of Northern Alaska," in "Report of the cruise of the revenue marine steamer *Corwin*, in the Arctic Ocean in the year 1885," pp. 81 sqq.; see p. 89.

† J. Felix "Das Mammuth von Borna," Leipzig, 1912, Sec. also p. of the present work.

‡ Marcellin Boule, "La Ballastère de Tilloul," in *L'Anthropologie*, Vol. VI, pp. 497-506.

shows 1 m. 70 cm. (a trifle over $5\frac{1}{2}$ ft.). The tusks found at Tilloux also appear to indicate that they belonged to an animal even larger than the mammoth of the Petrograd Museum of Natural History.* Two molars found in these same Tilloux deposits presented in their general aspect and the number and form of the ridges the well-known features of *Elephas meridionalis*. The fact, however, that these elephant remains had been found in association with prehistoric artefacts and that molars both of *El. primigenius* (the mammoth) and of *El. antiquus* should also be met with here under quite similar conditions was very noteworthy, as while remains of two of these species are occasionally found together, the association of all three in a single deposit is extremely rare.

The British Museum of Natural History contains the finest mammoth skull that has been found in England. It comes from the brick earth at Ilford, Essex. The tusks project 10 ft. 6 in. beyond the sockets. Unfortunately the skull is the only part of the skeleton that has been preserved, although when it was found the entire skeleton appears to have been present.†

Mammoth remains from the State of Illinois are to be seen in the Field Museum of Natural History, Chicago. With a skull of *Mastodon americanus* from Yorkville, Illinois, was preserved a single tusk the circumference of which was 23 in., the length along the curve being 6 ft. 3 in., while a direct line from one extremity to the other (the chord) measures only 3 ft. 7 in., these dimensions showing the great

*The characteristic differences of four of these tusks are brought out in Fig. 4, p. 502, of M. Boule's paper; all being given on a scale of 1:30. The figures indicate the following approximate measurements of the Petrograd mammoth tusk: length between extremities (the chord) 1.65 m., length along the outer curve 2.80 m. compared with 2.85 m. and (approx.) 3 m., or 9.84 ft. for the tusk of Tilloux.

†A Guide to the Elephants (Recent and Fossil) in the British Museum (Natural History), London, 1908, p. 41.

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The tusks of *Elephas imperator* found with three or four other remains, in association with *Equus Scotti*, in a sand pit at Dallas, Texas, are fine examples of the ivory growth in the mammoths of olden time. The joint weight of the pair is no less than 498 pounds, and the longest tusk has a length of 13 ft. 9 in.; the basal circumference of the right tusk is 23.7 in. or 60.2 cm.; that of the left tusk 22 in. or 55.9 cm. They are now in the Peabody Museum, Cambridge, Massachusetts.

The tusks in the skull of *Elephas imperator* found in the valley of Mexico and now in the Instituto Geologico, Mexico City, are pronounced to be the longest found in America, and are perhaps the longest in the world. A careful measurement made by Prof. G. R. Wieland, of Yale Museum, determined the exact length to be a few centimeters over five meters, equivalent to about 16½ ft. Indeed, it has been conjectured that this figure may fall a little short of the true one, as there may have been a loss of several inches in length through the placing of the tusks in their socket at the Institute.* The observer would hardly suspect the altogether unusual length of these tusks on account of the graceful double curve.

The molar of *Elephas meridionalis* Nesti has been found at Mino, Japan, and teeth of *Stegodon clifti* Falconer, Cope, and of the mastodon have been unearthed at Shodoshuna, Saunki, Japan.

The extent of the exports of mammoth ivory from Siberia is shown by the arrival in the United States, in 1914, of 90,000 pounds of this ivory all from the region of the Lena River. In a single shipment received during the year by an American firm there were an unusual number of tusks weighing upward of 100 pounds, while one exceptionally fine specimen weighed 225 pounds. Taking the whole range of these

*Communicated by Prof. G. R. Wieland.

Siberian mammoth tusks as shipped to-day, they are found to average more than five times the size and weight of the tusks from living elephants. The superior weight and the immense number of these mammoth tusks are clear indications at once of the extent of territory over which the primeval elephant wandered, and of the great age to which many or most of these animals must have attained.

In this great collection of mammoth tusks many were brown or yellow brown on the exterior. These are usually the most compact in structure, and the ivory in the best state of preservation; when the tusks are gray, or quite white, they are more likely to be fractured, and broken, and rough on the surface, with a superficial stringlike decomposition. Occasionally they are indented with pits from one to ten millimeters across and from one to four or five millimeters in depth. These may be due to the action of some vegetable acids.

Part of the mastodon tusks had a coating of a dull blue colour, due to the action of phosphoric acid in the seams of the ivory, on coming in contact with some iron while the tusks were buried. This material resembled odontolite, or "bone turquoise" as it is called, more correctly "ivory turquoise," used in the eighteenth century. It is undoubtedly vivianite, a phosphate of iron, occasionally met with on battlefields, where horses' hoofs with iron shoes have been buried with human and animal bones.

Nearly all the mammoth tusks show more or less wear—in some cases considerable wear—on the sides and at the ends. This is evidently due to extreme use of the tusks in digging up the soil in search of food. Mammoth ivory is also occasionally stained a bright red, almost a blood red, a stain produced by iron salts. Some of the ivory is very fine and compact and will make piano keys of the first quality, the colour being pure ivory white after treatment.

The cores taken out of mammoth ivory are more acute and pointed than in the case of elephant ivory, where the structure is more gradually tapering. The ivory scraps are sent to Japan and India in large quantities to be used for inlays in wood and for other ornamental purposes, as is done with the scraps of elephant ivory.

Many mammoth tusks received here have two, three, and up to five circular indentations; these are test marks of the finder or buyer, who tries the surface or bark of the tusk to ascertain whether the ivory beneath is in good condition or otherwise. If the bark or outer surface has disappeared or is unsound, this is a sign that the interior ivory is also unsound, and if the bark is spongy, or "dozy" in commercial parlance, this is a clear indication that the ivory is similarly soft and spongy. The hollow end of the tusk is called the "pulp end."

In many of the mammoth tusks the ring growths mentioned by Henry Fairfield Osborn as appearing on the Warren Mastodon are visible. On one tusk forty thin rings were to be seen; these were apparent if the hand were lightly passed over them. Just how these ring growths are formed, whether they are strictly seasonal and give precise or approximate indications of age, it is impossible to determine definitely, but it is quite possible that as the body develops the tusk is gradually pushed out and the ringlike markings become visible.

The shippers of tusks generally find that they are delivered in better condition if they are shipped unwrapped, as in this case more care is taken in handling them. However, tusks are sometimes wrapped in gunny bags. Mammoth tusks from Alaska are sewed with thongs in rawhide, the skin side within; these skins appear to be those of the dog, the yak, or some such animal. Frequently more than one tusk is wrapped in a single skin. The great mass of

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mammoth and mastodon ivory we have described was accumulated by a special collector, who obtained the material from various sources.

It is the even, constant temperature due to being buried in ice or frozen ground that has aided to preserve mammoth ivory. A temperature with but slight variations tends to preserve ivory; it is variation from extreme cold to extreme heat that injures all varieties of this material, and not the action of a constant temperature, either hot or cold. The tusk, lower jaws, vertebral bones, and the shafts of the limb bones of the mammoth and mastodon are generally preserved in remarkable perfection, but the skulls are usually decayed, being made up of diploic or cancellous bone tissue. As this tissue is filled with air spaces, the skulls often break soon after discovery, although found in perfect condition.

Fragments of fossil ivory thoroughly silicified and impregnated with manganese, so as to have acquired a "moss agate" effect, have been found in western Kansas, in the divide between the Smoky Hill River and the Republican River, north of Trego and Buffalo Park. The characteristic ivory structure was clearly apparent in these fossil pieces.*

Although it is doubtful that any records exist of the length of the elephant tusks secured by the hunters of Egyptian or Assyrian times, two tusks, the longer measuring about 2 ft. 5 in. in length, were found by Layard in the North West Palace at Nimroud. Only parts of these tusks have been preserved.†

At an early period the conquering Romans gained access to some of the accumulated ivory treasures of the East. The historian Livy relates that at the triumph celebrated

*Communicated by Prof. S. W. Williston, Dept. of Paleontology, University of Chicago.

†Layard, "Discoveries in the Ruins of Nineveh and Babylon," London, 1853, Pt. I, p. 195.

in 188 B. C. by Lucius Scipio Asiaticus, brother of Hannibal's great adversary, 1,231 elephant tusks were borne through the streets of Rome, and they were undoubtedly looked upon as constituting a notable part of the spoils of war.*

During the reign of Masinissa, King of Numidia (238-c. 148 B. C.), one of his officers landed on the island of Malta, and took from an ancient temple of Juno elephant tusks of altogether exceptional size, the most valued of the votive offerings in the temple. When these were first brought to the Numidian king he was greatly delighted with their rarity and size, but as soon as he learned whence they had come he ordered that they should be restored to the temple, no doubt in fear of the vengeance of the outraged divinity.† Indeed, Cicero states that they had been inscribed, in Punic characters, with the following words: "King Masinissa imprudently accepted these tusks; but learning the truth about them, he took care to have them replaced and restored." A century or so later the Roman Verres, the arch-plunderer of temple treasures, secured possession of them without feeling any scruples. This temple treasury also contained many ornaments of ivory and a statue of Victory of the same material.

In a temple of Diana at Capua there was preserved a complete skull of an elephant with the tusks.‡ This curiosity was undoubtedly a temple-offering of great value. Indeed, Pliny tells us that the great size of elephant tusks could best be appreciated by visiting the temples.**

*Livy, Lib. XXXVII, cap. 59, "tulit in triumpho . . . eburneos dentes millia ducentos triginta unum."

†Cicero, In C. Verrem, II, Lib. IV, § 103.

‡Pausanias, Lib. V. cap. 12, par. 3.

**Pliny, Nat. Hist., Lib. VIII, cap. 10. In a note to this passage Hardouin, writing about 1740, states that he saw in the workshop of one of the Dieppe ivory carvers a tusk weighing over 100 pounds and about 7 ft. long. See his edition of Pliny, Paris, 1741, Vol. I, p. 441, note 25.

Fossil ivory appears to have been known as early as the third century B. C., as Theophrastus writes that the colour of ivory that had been dug up was a mixture of white and black.* In their ignorance of the true nature of these deposits the ancients took refuge in the explanation that elephants sometimes buried the tusks they had lost through old age, accident, or violence.†

When Firmus of Seleucia, the friend and associate of Queen Zenobia of Palmyra (fl. 270 A. D.), was overcome by Aurelian (c. 212–275 A. D.), the latter secured among other valuables two enormous elephant tusks, each 10 ft. in length. Of these, with the addition of two others, Aurelian proposed to have executed a seat or throne upon which should be placed a golden and jewelled image of Jupiter. This design was probably frustrated by the emperor's death, and we are told that the tusks were eventually given to "a certain lady," who had them worked up into a couch for herself.‡

One of the ninth-century relics in the treasury of the Cathedral of Aachen is an entire elephant tusk, rounded off at either end and having a series of longitudinally cut and smoothed surfaces. These are in part adorned with designs of animal forms in low relief. During the Middle Ages it was provided with a gold mounting and ornamented with gems cut *en cabochon*. Possibly in its original state, before carving, the tusk may have been among the gifts sent by Khalif Haroun-al-Rashid to Emperor Charlemagne. As has been noted, a live elephant was one of the most important and interesting of these gifts. There is also, however, a possibility that the tusk in question may have come from

*Theophrastus, "De lapidibus," cap. 37.

†Pauly's "Real Encyclopädie des class. Altertumswissenschaft," Vol. V, Stuttgart, 1905, p. 2358; art. Elfenbein.

‡Flavii Vopisci, "Firmus," in *Scriptores Historiæ Romanæ*, Heidelbergæ, 1743, Vol. II, p. 421.

this elephant, which died so soon after it was brought to Europe.*

A Chinese writer of the thirteenth century who treats of the various articles of commerce in his day says that from the Somali Coast were obtained elephant tusks of large size, sometimes weighing more than 100 catties (about 133 pounds).† A still earlier Chinese authority, the Yu-ang-tsa-tsu, dating from the ninth century, affirms that the natives of this coast used the tusks of elephants as offensive weapons in their fighting.‡

In an old English version of one of the Alexander romances, so popular in medieval times, occurs a passage showing the exaggerated ideas prevailing among very early writers as to the number of elephants used for warlike operations. Describing the elephants in the battle array of the Persian king Darius, Alexander's opponent, the romancer says:**

Fourty thousand, alle astore
Olifautes let go to-fore
Apon everiche olifaunt a castel,
Theryn XII knyghtis y-armed wel.
They scholle holde the skirmyng§
Ageyns Alisaundre the kyng.

De Vries, writing toward the end of the seventeenth century, probably greatly exaggerated the number of elephant tusks brought to India, which he puts at six hundred thousand; part of this import went to China. He reports elephant tusks weighing as much as two hundred pounds "apoth-

*Dictionnaire d'Archéologie Chrétienne, ed. by Dom Fernand Cabral and Dom H. Leclercq, Paris, 1911, Fasc. xxv, col. 693, Art. *Charlemagne*.

†Chau Ju-Kua, "Chu-fan-chi (A Description of Barbarous Peoples)," trans. by Friedrich Hirth, and W. W. Rockhill, St. Petersburg, 1911, p. 129.

‡Ibid., p. 129.

**Thomas Wright, "The Archæological Album," London, n. d., p. 177.

§Skirmish line.

caries' weight, twelve ounces to the pound, or twenty-four *loth*." A curious circumstance related by this author is that when a Hindu woman lost a blood-relation she broke up all her ivory ornaments, replacing them with others when the period of mourning had expired. The women wore, as a rule, no less than twenty ivory or shell arm-rings (bangles) on their arms.*

That large tusks were occasionally secured from the wild elephants of Sumatra is attested by the Bolognese traveller, Ludovico Barthema, who visited that island in the first decade of the sixteenth century. He asserts that he saw there two tusks having a united weight of 336 pounds.†

Although the Cinghalese elephants so rarely have tusks that a qualified informant states that but one in a hundred is so provided, a small amount of ivory is collected in Ceylon and exported thence, largely to China. The Chinese are credited with the opinion that Cinghalese ivory is the best adapted for their dainty carvings, as in their opinion it excels all other in density of texture and delicacy of tone.‡

The seventeenth-century French traveller Tavernier states that in his time it was found that the ivory from the Island of Ceylon and from Achen did not turn yellow, as did much of that derived from the mainland and from the "West Indies," which must mean African ivory; hence the Cinghalese ivory was the most highly esteemed in Tavernier's time.** The Abyssinians when they wished to make a feast asked the consent of their overlord to kill an elephant. To him they surrendered one of the tusks, retaining the other for themselves and banqueting on the flesh of the

*S. de Vries, "Curieuse Anmerckingen der Oost en West-Indische Verwonderens-waerdige Dingen," Utrecht, 1682, Pt. IV, p. 1208.

†John Ogilby, "Africa," London, 1670, p. 13.

‡Tennant, "Sketch of the Natural History of Ceylon," London, 1861, p. 78.

**Les six voyages de Jean Baptiste Tavernier, Paris, 1678-9, Vol. II, pp. 200-201; "Voyages des Indes," Liv. I, xviii.

animal, which they regarded as a great privilege. They had dealings in ivory with the Portuguese, and tusks were so plentiful along the coast that they were used as palisades to enclose gardens, so that they may be said to have had ivory fences.*

In his exploration of the region of the Lower Ubanja, M. Gérard gained the impression that the natives of this territory were ignorant of the value of ivory. That the material was present in considerable quantity, however, was shown by the view of a number of large tusks planted upright and looked upon as attributes of the power of the chief.† The principal units of value in the Upper Congo are slaves and elephant's tusks, a slave being generally regarded as equaling a tusk in value.‡

Two very fine tusks were received in Antwerp from the Congo region in 1896, the finest in all respects that had as yet been brought thither. One of them measured 2 m. 60 cm. in length, while the other was slightly longer—namely, 2 m. 75 cm., or 8 ft. 6 in. and 9 ft. respectively. The weight of each is given as 78 kilograms, or about 171½ pounds.** These considerably exceed in size the finest pair preserved in the Musée du Congo, which measure respectively 2.43 and 2.45 cm., or a small fraction over and under 8 ft.§

A pair of tusks of exceptional size and weight, each 9 ft. long and weighing together 330 pounds, were secured by Sir Ralph Moore from the French Territory of the Gold Coast, West Africa, where he occupied the place of High Commissioner of the British Government. He exhibited

* Tavernier, "Receuil de plusieurs relations," Paris, 1702, p. 312.

† "La Belgique Coloniale," Vol. I, p. 435; 1895-6.

‡ Ridgeway, "The Origin of Metallic Currency and Weight Standards," Cambridge, 1892, p. 42.

** "La Belgique Coloniale," 2d Année (1890), p. 35.

§ Dr. H. Schouteden, "L'éléphant nain du Congo," in *Revue Zoologique Africaine*, Vol. I, Fasc. 2, p. 222, August 31, 1911.

them in 1905 in the Indian Colonial Exhibition at the Crystal Palace, London. They are now owned by Mr. H. J. Heinz of Pittsburg, Pa.

The elephants of Bamba, a province of Congo, were reputed to attain a very great size, so that, in the words of John Ogilby: "Some of their teeth weigh'd about two hundredweight: in Congoish Language such a tooth they call 'Mene-Manzo.'" This writer says that many tusks, "scurfed or hollow," were found in the wilderness, having become so by exposure to rain and wind, and he also states that such a great abundance of ivory had been brought from this region since the early part of the century, that when he wrote, in 1670, the supply had begun to diminish, as the natives were obliged to go farther into the interior of the country to secure the material.* This may seem strange in view of the enormous quantity of ivory brought from the Congo region later, and down to our day, but three hundred years ago only a small part of this immense country was in any way accessible to travellers.

The Nyami, or chief ruler of the Bushongo in the Congo region, always establishes his permanent abode in a place chosen, at his accession, as the royal capital. On very rare occasions, however, he travels through the territory occupied by the tribes which acknowledge his authority. On such occasions, it is, and has been, customary to set up a fine elephant's tusk that serves as the back of the royal seat, on his arrival at any considerable settlement where he is to break his journey. When this tusk has been so honoured, it is left in its place after the Nyami's departure, and becomes a memento of the royal favour. The most celebrated of these Bushango chiefs was Shamba Balongongo, who reigned about 1600 A. D. A Belgian scientific expedition was recently permitted to take away an exceptionally fine,

*John Ogilby, "Africa," London, 1670, p. 529.

sculptured tusk, which had long marked one of the stages in a royal progress of the renowned Shamba. Centuries ago these Nyamis are said to have borne the title Chembe Kunji, or "God upon earth."*

The half-legendary tales of elephant burial grounds, with their long accumulated stock of valuable tusks, have little or no foundation in fact. A story told, however, in regard to an episode of the suppression of the Arab slave trade by the Powers, a movement largely due to Livingstone's passionate denunciations of this iniquitous practice, may perhaps point to the existence of a hidden ivory treasure. It is stated that a party of Arab slave raiders, who in their precipitate retreat to avoid attack and capture were obliged to get rid of all unnecessary impedimenta, buried a large number of elephant tusks of which they had secured possession on the borders of a small lake in the Eastern Congo, or, possibly, in the bed of the lake, beneath shallow water.†

We read so often of successful elephant hunts that some may be almost inclined to fancy that, for the well-armed and equipped European at least, this sport can scarcely be looked upon as a hazardous one. But it is stated that the saying goes among professional elephant hunters that sooner or later the hunter is sure to lose his life from the attack of a bull-elephant. The names of several who have thus met their death in the Congo and Rhodesia have been recently recorded. One had his head torn from his body by an infuriated bull he was hunting in the Loango; another was trampled to death in the Congo region. Goddard, considered to be one of the most experienced elephant hunters, was killed in northeastern Rhodesia; another met his death while hunting in the Lower Loango, and, not more than a

*"Annales du Musée du Congo Belge," Ethnographie et Anthropologie Sec. III, Vol. II, Fasc. I. "Les Bushongo," by E. Toudy and J. A. Joyce, Brussels, 1910, p. 64, Fig. 50 (on p. 73).

†*Sunday Times*, Johannesburg, Transvaal, February 22, 1914.

few months ago, a young hunter named Parr was killed in Rhodesia.*

The following recital by the elephant hunter, James Sutherland, of a combat between two bull-elephants in equatorial Africa, illustrates the immense power of the thrust of these animals. . He says:†

“The larger bull staggering perceptibly under the furious onslaught appeared for some moments as if he were going to fall, but, recovering his equilibrium, and as if fully intent on avenging the injury, returned the charge and dealt his foe a crushing blow on the shoulder, sideways, with his tusk. The punishment must have been severe, for the younger elephant at once backed out of the fray, but, regaining his courage, pluckily resumed the contest by rushing forward and giving the big fellow a tremendous prod in the shoulder, the force of the thrust snapping off a piece of his tusk. This broken portion I afterward found and kept as a memento of the only elephant fight I ever saw. . . . The tusk of the smaller animal was broken in two places, but the first piece forming the tip was never found.”

The combatants soon found a more deadly enemy in the European hunter who brought both of them to the ground with two well-aimed shots. The enormous strength of this animal was here strikingly exhibited in the fracturing of so tough a material as ivory in the body of its antagonist.

One of the heaviest tusks from East Africa was brought to Europe by a Hamburg firm of ivory dealers and was sold to the late King of Bavaria, the eccentric and gifted Ludwig II, who destined it to be used as a chandelier. This tusk weighed 94 kilograms (207 pounds) and measured 2.6 meters (8 ft. 4 in.) in length.‡

**Sunday Times*, Johannesburg, Transvaal, February 22, 1914.

†James Sutherland, “The Adventures of an Elephant Hunter,” London, 1912, pp. 95-98.

‡Somborn, “Die Elfenbein-und Beinschnitzerei,” Heidelberg, 1899, p. 18.

The British Nimrod, Gordon Cumming, states that he had in his possession a tusk 10 ft. 9 in. in length and weighing 173 pounds. This was from an African elephant. If the measurement is correct, it would be the longest tusk recorded from the existing species of elephants, if we except the two remarkable examples in the Bronx Zoölogical Collection of Horns.*

A curiosity recently exhibited in Siam at the housewarming of one of the provincial governors is a *black* elephant tusk, 3 ft. in length, the diameter being above 6 in. Because of its rarity and possibly also on account of a belief that so unusual an object must possess talismanic virtue, this black tusk had been carefully preserved for generations in the governor's family as a greatly prized heirloom. Some of the wealthy merchants in Siam decorate the walls of their houses with thousands of dollars' worth of large tusks. The Siamese elephant has furnished some of very considerable dimensions, one in the National Museum at Bangkok having a length of 9 ft.

At an important State function in Siam one of the nobles wore a splendid jewel set with diamonds, rubies, and sapphires. A European, who was much struck by its richness and beauty, asked of the Siamese grandee if he might examine it more closely, but, on being accorded the privilege, he was surprised to note the presence of an insignificant little piece of old ivory as a pendant, and spoke of this to the Siamese. "Oh," replied the latter, "that I consider to be the most valuable part of my jewel. It is the tip of an elephant's tusk found embedded in the trunk of a tree to which the animal must have given such a violent thrust that he could not free the tusk again without breaking off its point.

*Ronalsyn Gordon Cumming, "Five Years of a Hunter's Life," New York, 1850, Vol. I, p. 263. In Lydekker's "Royal Natural History," Vol. II, p. 546, this tusk is stated, through an evident misprint, to have measured 20 ft. 9 in. in length.

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This I would have ground if I were ill, and if I took some of the powder it would surely cure me. In Siam we look upon such an object as a priceless amulet, one that protects its owner from disease and misfortune."

As ecclesiastical decorations elephants' tusks have occasionally been employed, and we are told that in 1848, when General De Lima was about to return from the Portuguese settlements in Mozambique, where he had held the office of governor, to Goa, in Portuguese India, he was commissioned to select and bring over with him to India the finest, and above all the straightest, pair of tusks he could find that they might be used in forming a cross for the adornment of the Cathedral of Goa. He was able to carry out this commission successfully and brought with him two tusks, one of which weighed 180 pounds and the other 170 pounds, the curve in both being very slight.*

While the weight of African bull-elephant tusks averages less than 50 pounds, exceptionally large animals have furnished tusks weighing many times as much. For example, one given to George V, then Duke of York, in 1893, weighed 165 pounds and measured 8 ft. 7½ in. in length. The *Journal of the Society of Arts* is responsible for the statement that in or just before 1864 an American house owned a tusk 9 ft. 8 in. in length.† Professor Owen notes the existence of an Indian tusk 9 ft. in length, with a basal diameter of 8 in., and weighing 150 pounds.‡

The effect of our dry climate upon the weight of a tusk is strikingly illustrated in the case of two splendid specimens from an African elephant. After they had been brought to New York they were kept here for two years and then sent back to London. On reweighing them it was found that the

*Tennant, "Sketch of the Natural History of Ceylon," London, 1861, pp. 79, 80, note.

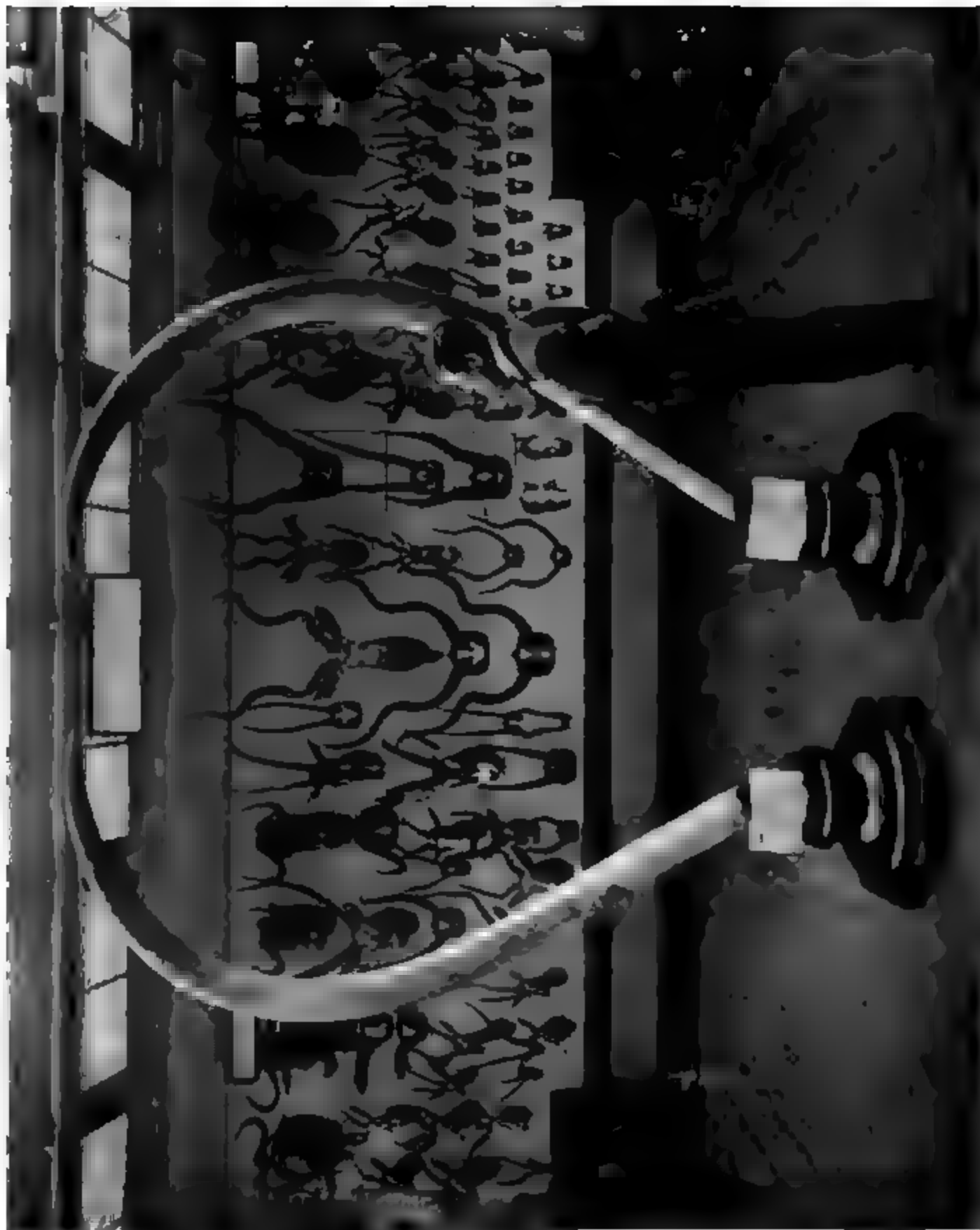
†*Journal of the Society of Arts*, Vol. XII, p. 190; 1864.

‡See *Jour. of the Soc. of Arts*, Vol. V, pp. 65-70, December 19, 1856.



**THESE ARE BELIEVED TO BE THE TWO LARGEST TUSKS
IN THE WORLD**

**ONE, WEIGHING 220 POUNDS, IS NOW IN THE BRITISH MUSEUM
A TYPICAL ARAB DOOR AT ZANZIBAR SHOWING THE DELICATE CARVING**



TUSKS OF A SOUDANESE ELEPHANT

A BEAUMAP PAIR OF TUSKS PRESENTED TO THE NEW YORK ETHNOLOGICAL MUSEUM BY THE NEW YORK ETHNOLOGICAL MUSEUM. THE TUSKS WERE OBTAINED IN 1907. LENGTH, 11 FEET 8 INCHES AND 11 FEET. CIRCUMFERENCE, 14 INCHES AND 14 INCHES. WEIGHT, 100 LBS.

weight had diminished to 226 pounds and 216 pounds respectively, a loss of about 10 pounds on each tusk, over 4 per cent. of loss. The price paid by the British Museum for the one purchased for that institution was £350 (\$1,750); for the smaller tusk Messrs. Joseph Rodgers & Sons paid £325 (\$1,625). These wonderful examples of elephant ivory far exceed in weight, though not in length, any others that have been secured. The next in weight among those owned in England is one weighing 198 pounds, in the possession of Major H. B. Powell Cotton. Even tusks ranging from 100 pounds to 110 pounds in weight have been but rarely found during the past five years.

These famous tusks, the heaviest ever brought from either Africa or India, came from Kilimanjaro, East Africa. Their original weight was 236 pounds and 225 pounds, respectively, the exact dimensions of the larger one being given as follows:*

Length of outside curve	10 ft. 1 in.
Length of inside curve	8 ft. 10 in.
Base to tip in straight line	8 ft. 1 in.
Circumference at commencement of solid ivory	23½ in.
Circumference at hollow end	23¾ in.
Diameter at commencement of solid ivory	7¾ in.

The remarkable pair of tusks noted above were bought in Zanzibar in 1900 for \$5,000, and were exhibited for some time by Tiffany & Co., of New York. The Arab who killed the elephant declared that the aged animal was hardly able to drag himself along, borne down as he was with the immense weight of his tusks. Zanzibar ivory is of the variety known as "soft ivory," the best material for working. Some of the "soft ivory" from the West Coast is exceedingly brittle, and it is related that a tusk of this type, while stand-

*Communicated by Hugo Landsberger & Co., of London.

ing in the London Ivory Docks, cracked with a report as loud as a pistol shot, owing to the contraction consequent upon exposure to the cool air.*

The two magnificent tusks now in the Bronx Zoölogical Park, National Collection of Horns, were donated to the New York Zoölogical Society by the late Charles T. Barney, at an expense of \$2,500; they are believed to be the longest, though not the heaviest, in any collection from living species of elephants. The respective lengths are 11 ft. 5½ in. and 11 ft., one having a circumference of 18 in., that of the other being 18¼ in.; the combined weight is 293 pounds. These tusks are said to have been originally bestowed upon an official of the French Government by Emperor Menelik of Abyssinia.† The elephant from which they were taken was a Soudanese example of the African species, *Elephas oxyotis*.

The *Elephas imperator*, which existed in the western part of the North American Continent, appears to have been the largest of all the species of elephants of prehistoric or historic times. This receives confirmation from the size of two somewhat imperfect tusks from one of this species found in the tar-pits at Rancho la Brea, near Los Angeles, California. These tusks have a diameter of eight inches, and though incomplete, the length when perfect seems to have been from 15 to 16 ft., considerably longer than has been observed in the case of elephant remains of other species. A curious circumstance in regard to the elephant remains in the Rancho la Brea deposits is that while not widely distributed therein, the bones of seventeen Imperial Elephants were found buried in pit nine, measuring only 35 ft. in depth and about 30 ft. in diameter. To what

*Mrs. Harris R. Childs "The Trade and Trail of Tuskers," in *McClure's Magazine*, Vol. XXXII, p. 653, April, 1908.

†See *Harper's Weekly*, Vol. LI, p. 475, March 30, 1907.

particular causes this heaping up of elephant remains in so small an area can be due is not easily explicable.*

The ivory cellar of the great cutlery firm of Joseph Rodgers & Sons, Ltd., at Sheffield, England, is always kept stored with an immense mass of the finest ivory, destined to be worked up into knife-handles and scales. In 1878 these accumulations amounted to 26 tons in weight, and consisted of 2,561 tusks, averaging $22\frac{3}{4}$ pounds each. The value of the ivory stored here at present—some fifteen tons—is put at \$110,000. Some of the finest tusks acquired by the firm are set up in the entrance hall leading to the showrooms. The largest of these, to which we have already alluded, measures 10 ft. in length and weighs 216 pounds, and alongside stand a pair having the aggregate weight of 315 pounds, and measuring 8 ft. 7 in. in length; three others, again, have an average weight of 130 pounds.

An expedition to secure specimens for a group of African elephants to be set up in the American Museum of Natural History in New York was organized in August, 1909. The best single example secured was a young, adult bull, measuring 11 ft. 3 in. in height and having tusks weighing 100 pounds and 102 pounds respectively. A curious circumstance is that the oldest bulls are those which have enjoyed the protection of a large herd of aggressive cows. In one instance when an exceedingly large bull-elephant had just been killed, some of the females made desperate efforts to lift him with their tusks and trunks, while others charged about in every direction in search of the assailants. This fine bull-elephant measured 11 ft. 4 in. in height, and one of his tusks weighed 110 pounds. It is suggested that every effort should now be made to obtain the finest living specimen of the African race before it is too late, as even at present

*H. S. Swarth, "Guide to the Fossil Animals from Rancho la Brea," in the Museum of History, Science, and Art, Los Angeles, 1915, p. 7. See p. 358 of present work.

old bulls have become exceedingly rare, for when a bull-elephant has developed tusks weighing, say, 50 pounds, he does not usually long escape the zeal of the hunters for ivory, either natives or foreigners.*

The National Museum at Dublin, Ireland, possesses an exceptionally fine elephant tusk weighing 176 lbs. It was brought from the Uganda region in equatorial Africa and measures about 6 ft. 3 in. in length. The circumference taken at the middle of the tusk is 23 in., at the socket a trifle less; owing to slight irregularity of the oval the diameter at the socket varies at different points from $6\frac{1}{2}$ to $7\frac{1}{2}$ in. This fine tusk was originally the property of Mr. Graham Pownall.†

A beautiful and symmetrical pair of tusks belong to the Brunswick-Balke-Collender Company. The longer measures 8 ft. 3 in., the other one being but $1\frac{1}{2}$ in. shorter. In circumference also there is very little difference, the longer tusk having a girth of 18 in. and the shorter one of $17\frac{5}{8}$ in. This comparative evenness of size coupled with an exceedingly graceful curve combine to render the tusks real ornaments. The comparatively slight difference between the measurements along the curve and that between perpendiculars, in one case 8 in., in the other case $7\frac{1}{2}$ in., shows the gracefulness of the curve in these tusks.

Two heavy tusks were secured by the elephant hunter, James Sutherland, when he brought down a big bull-elephant with a single well-aimed shot through the forehead to the brain. The heavier of the tusks weighed 152 pounds

*Carl E. Akeley, "Elephant Hunting in Equatorial Africa," in the *Museum Journal*, Vol. XII, No. 2, pp. 43-62; February, 1912. (Illustration of large bull with 110-pound tusk, on p. 49, copyright by Carl E. Akeley).

†Communicated by Dr. R. S. Scharff of the National Museum, Dublin, Ireland. The tusk weighing 175 pounds and having a circumference of $23\frac{1}{2}$ noted in Rowland Ward's "Records of Big Game," was owned by Graham Pownall, and may be the other one of a pair, although the great difference in length makes this improbable.

and the lighter $137\frac{1}{2}$ lbs., making $289\frac{1}{2}$ lbs. for the pair. A queer incident immediately succeeded the fall of this ponderous animal. The hunter had been in pursuit of three elephants, and one of them turned back quickly on seeing his companion fall, rushed toward him and gave him a violent thrust, wounding him and injuring the body very seriously, one of the tusks deeply penetrating the abdomen. Whether this was done in anger or to induce the fallen animal to get up and continue its flight is uncertain, but seeing that these energetic measures were ineffectual, the still unharmed elephant quickly resumed its mad career.*

A fine pair of tusks belongs to Lieut. Alexander H. Wheeler, having been secured from an elephant he shot at Mohoroni, British East Africa. One of the tusks measured 7 ft. $\frac{1}{2}$ in. in length and weighed 81 lbs., the other one being exactly 7 ft. long and weighing 79 lbs.; in each case the circumference is $18\frac{1}{4}$ in. Lieut. Wheeler is at the front in the Dardanelles with the British expeditionary force as this book goes to press, and with the French Army is another noted elephant hunter, Mr. W. Sewall. The latter has hunted over the greater part of equatorial Africa since 1905, with his headquarters in British East Africa. In all he has shot between 30 and 40 elephants. The Harvard Club in New York City has as a trophy the head of one of the elephants brought down by Mr. Sewall, the slender, gracefully curved tusks being of singular beauty, although they weigh not more than 80 lbs apiece. The best pair secured by this hunter weighed 124 lbs. and 129 lbs. respectively, a joint weight of 253 lbs. They were the spoils of an elephant shot in the Belgian Congo. Mr. Gerrit Forbes, of Boston, can claim an even larger elephant bag, for he has killed 48 elephants in the years between 1907

*James Sutherland, "The Adventures of an Elephant Hunter," London, 1912, p. 104.

and 1913, in British East India, Uganda, the Congo, and the Sudan. The heaviest pair of tusks he obtained weighed, respectively, 88 lbs. and 103 lbs.

In Africa the deposits of buried elephant tusks are often discovered by the merest chance. For example, elephant hunters while travelling through a swamp will sometimes feel beneath their feet what they think to be roots in the swampland, but upon investigation these may prove to be not roots but elephant bones, the swamp being filled with skeletons of these animals. From such masses of bones many valuable tusks have been obtained and have ultimately found their way to the ivory workers. This and similar experiences serve to explain the occurrence of mastodon and mammoth remains in such quantities in various parts of the world. Evidently the elephant, when ill or injured, will do what the horse does under similar circumstances, namely, select a damp or cool place to bathe in; and perhaps to obtain more succulent food may be attracted to a piece of swampland, and being so heavy the animal will naturally sink into the soft bottom. Then again, if driven or hunted by man or lion, in attempting to make its escape through a swamp, such as those so often to be found in the Congo district, the elephant may sink down into the wet earth until it becomes completely buried.

Of the elephant burying grounds described by Paul Carpentier and others, there exists among the African natives a belief that when an old bull is decrepit or extremely ill he will travel to the northward and in thus instinctively following a straight line in his course, he may run into a swamp and become buried there, although under normal conditions he might have been inclined to turn aside and avoid it; or else, being very ill, he may die in the place where he sought relief.

During two hunting expeditions to equatorial Africa, in

1899–1900 and 1902–1903, Mr. William Fitz Hugh Whitehouse killed twelve elephants. For part of the time Mr. Whitehouse was elephant hunting for the Emperor Mene-lik of Abyssinia; he only kept a single pair of tusks for himself, and states that the largest tusk in any of the bull-elephants he killed weighed 98 lbs.; the heaviest one of a female elephant had a weight of but 45 lbs. Mr. Whitehouse calls attention to the fact that there is considerable loss of weight through drying out, and as his heaviest tusk was only weighed a year after the elephant was killed, its original weight may have been at least 100 lbs.

In the National Collection of Heads and Horns shown at the New York Zoölogical Park is a monster elephant head complete with trunk and tusks. This was one of the trophies brought back by Mr. Richard Tjader from a hunting trip to equatorial Africa in 1906, the elephant having been brought down near the Gojito Mountains, British East Africa, by a single front head shot to the brain. Accurate measurements were made, and these showed a height of 11 ft. 4 in. The tusks were 7 ft. 2 in. long and weighed together 168 lbs. The weight of the mounted head is 1,750 lbs. and the spread from tip to tip of the enormous ears is more than 10 ft.; the trunk is 8 ft. 6 in. long. As to the ability of some of the large African elephants to break down good-sized trees, Mr. Tjader relates that he once came across a perfectly sound tree, measuring $33\frac{1}{2}$ in. in circumference, that had been broken off by an elephant about 7 ft. from the base. Another somewhat interesting circumstance is the confirmation by a European of the story told by native hunters that the elephants of a certain district in German East Africa are exceedingly fond of a species of root which acts upon them as a powerful intoxicant, sometimes overcoming them so thoroughly that they will lie down, an unusual thing for an elephant, and fall into such a sound

sleep that native hunters can despatch them with swords or spears.*

A weighty pair of tusks from an African elephant may be seen in the W. S. Cherry Collection of the Los Angeles County Museum. The donor was a renowned elephant hunter, who had travelled over 40,000 miles in Africa. One of the tusks weighs 167 lbs., the other 165 lbs., making a joint weight of 332 lbs. for the pair. The length of the heavier one is 8 ft. 5½ in. with a circumference of 20½ in., the lighter one measuring 8 ft. 3 in. in length and 20 in. in circumference.

A very fine and well-matched pair of tusks were secured by Mr. James Barnes of New York City during a hunting trip in Africa extending from April, 1913, to May, 1914. He traversed the elephant regions in Uganda, British Africa, and also the Ituri and Aruwimi forests of the Belgian Congo. Here there are still vast herds of elephants, and on one occasion the hunter found himself in the midst of a herd numbering, he believes, fully one hundred and fifty elephants. One of his adventures was the shooting, on a bright moonlight night, of a rogue elephant that had long raided the plantations of the villagers on the Loya, a tributary of the Ituri. From this bull-elephant came the tusks above mentioned, one of which measured 9 ft. 4 in. in length, with a circumference of 17¾ in., the other being 4½ in. shorter and the circumference 17 in. The weight was only approximately ascertained and was in each case a little under 100 lbs., so that the tusks were not as massive as some others, although the length of the longer one places it in the front rank of those from the African elephant.

Another of our elephant hunters, John H. Prentice, Esq., visited Africa in February and March, 1914, and killed two elephants at the headwaters of the White Nile, in the

*Richard Tjader, "The Big Game of Africa," New York and London, 1910, pp. 64-66, 74.

Sudan. Their tusks have been carefully measured, and show the following dimensions and weights:

Length along outside

curve 7 ft. 3 in. 7 ft. 2 in. 6 ft. 3 in. 6 ft. 1 in.

Length along inside

curve 6 ft. 5 in. 6 ft. 1 in. 5 ft. 5 in. 5 ft. 2 in.

Greatest circumfer-

ence 18½ in. 18½ in. 19 in. 19 in.

Circumference at base 18 in. 18 in. 18½ in. 18½ in.

Weight 70 lbs. 68½ lbs. 64 lbs. 58½ lbs.

There appears to be considerable difference in the average size of tusks from the various African regions. For example, while those from Abyssinia and Taka show an average of about 25 lbs., the average for tusks from Central Africa is about 40 lbs., the usual limit of size being 40 lbs. from the former region and as high as 140 lbs. from the latter; this, of course, leaves out of account the occasional tusks of altogether exceptional weight. The difficulty experienced in securing a really symmetrical pair of tusks is principally caused by the fact that an elephant will use one of them, either the right or the left, as the case may be, more frequently than the other, just as most men employ the right hand more usually than the left one. This "working tusk" called by the Arabs the *Hadam*, or "Servant," will therefore exhibit great signs of wear. Although its trunk is of vastly more use to an elephant than its tusks, still the African elephant, a much more decided tree feeder than the Indian, utilizes them in the wholesale destruction of mimosa trees, a favorite article of diet. By thrusting the tusks like crow-bars under the roots of such trees, which while generally from 16 ft. to 20 ft. high, have no tap roots, the elephants can easily bring them to the ground.*

* This and the following paragraph communicated by Lieut. F. W. Feavearyear of the British Army.

420 I V O R Y A N D T H E E L E P H A N T

In the Sudanese province of Bahr el Ghazel elephants abound, and there is a good supply of ivory. Broken tusks and those of poor quality come to Omdurman to be worked up by the native carvers into serviette rings, cigarette holders, mounts for sticks, and large bangles worn on their arms by the natives. The better tusks are cut into three pieces, the hollow end with thin sides going to Japan for inlaying work; the solid middle is sent to England, the tips usually go to the United States for billiard ball manufacture. The weight used at Omdurman is the *kantar* (99.05 lbs.); in other parts of the Sudan the weight unit is the *farasula* (29.7 lbs. or 13.478 kilo.), equivalent to the weight of 480 dollars or 4,320 dirhems. Exceptionally fine ivory has recently, during the war period, commanded as much as £40 a *kantar* at Omdurman, a trifle less than \$2 a pound. Most of the ivory trade in the Sudan is by barter, mainly, if not exclusively for cattle, preferably cows and calves, but on occasion bulls may be included to make up a reckoning.

There has been, on the whole, no very marked change in the average weight of the tusks imported to Antwerp, although just at the outset, in 1889, an average of $12\frac{1}{2}$ kilo. was reached; in 1890 the figure was $10\frac{9}{10}$ kilo. These high averages have not been since equalled, and were due to the number of large tusks, the first to come from the new ivory of the Congo; withal the total weight of ivory, as will have been noted, was much less than a few years later. From 1892, however, the average weights have been singularly constant, if we except a single year, 1896, when for some reason there was a fall to $6\frac{2}{7}$ kilo.; in 1913 the figure was $8\frac{3}{8}$ kilo., equivalent to 18.46 lbs.

In a previous chapter we have given a brief notice of the work of the native Congo ivory carvers, but it may not prove uninteresting, as showing the possibilities of tusk decoration, to give here in detail the figures depicted in

the carved spiral band adorning one of them. Dr. Carlos E. Cummings, to whom we are indebted for much interesting information regarding the Congo ivories of the Buffalo Society of Natural History, remarks that the native carvers' choice of the serial designs does not seem to have been guided by any logical sequence of thought, and finds a possible explanation of this in the fact that the carver, Mabeale, executed the works in Buffalo under the new, strange, and disturbing influence of a twentieth-century exposition. Of the young Congo carver's personal appearance—he was apparently not more than twenty years old—Dr. Cummings says: "He possessed a mouth conspicuous for its size even among his brethren, a nose hardly elevated above his cheeks, and a face as absolutely devoid of intelligence as one of his own carvings." Two of the tusks had already been carved before his arrival in Buffalo; others were finished in the twenty weeks of his stay there. In spite of his unquestionable skill in making use of the simple tools with which he was equipped, Mabeale was quite unable to make any success in sketching with a pencil. As an adequate illustration of the jumble of images in these spiral tusk decorations, we here give a full description of one of them carved in Africa before the native's departure for America, and exhibiting seven complete turns of the spiral.

1. The lower end of the spiral shows an alligator $7\frac{1}{2}$ in. long with its jaws closed on the thighs of a native boy. 2. The house of Mons. X. Pène, complete with balcony and windows, raised on posts above the ground; in front a flag is flying from the flagpole. 3. Mons. Pène standing with notebook and pencil, his foot resting on a bale of goods placed on the ground. 4. Four native porters, bearing bundles on their heads. 5. Three natives, chained together by the neck and bearing bundles of goods on their heads, are followed by an Arab with fez sword and a flint-

lock gun carried over his shoulder. 6. A native with cap, coat, and trousers, bears on his shoulders two baskets, hung on the end of a long pole. 7. A very well-carved hand emerges from a cleft in the ivory and holds the body of a big fish, transfixed on the prongs of a three-tined barbed spear. 8. An antelope. 9. Two natives, accompanied by a dog, bear a third native in a hammock. 10. A native with a staff carries on his head a chest with handles. 11. A big elephant, perfect in every detail. 12. A dove perched on the lower branch of a five-branched tree, to which a boy is lashed and hangs half suspended, fixed by arm and leg with a long rope. In front of the boy stands a bearded priest with a single feather in his hair, about to attack the boy with a big knife. 13. A native sitting in front of a thatched house. He is making a fire under a pot placed on big stones, and in the background rises a date palm in full fruit. 14. A native holds a spear pointed downward over the back of a small dog. 15. A big rhinoceros. 16. A native leading a prisoner by a rope around his neck. 17. An antelope or goat. 18. A coiled snake. 19. On one side of the tip is an alligator with a native in its mouth, on the other side a medicine man with knife, fetish, and plumed hat.

In Loango the most ingenious method employed for carrying elephant tusks consists of plaiting two rows of vegetable fibre, about 4 in. apart, near the upper or hollow end of the tusk, and then connecting the fibres by a plaited handle of the same material, so that the tusk can be carried in the hand and hung up on a peg at the resting-places. To keep a hollow tusk from drying out, and also perhaps to facilitate its use for a musical instrument, some pieces of rawhide are often shrunk over its edge.

There is in the W. S. Cherry Collection, of the Los Angeles County Museum, an ivory trumpet made in the Congo, which is 4 ft. 4 in. long and has a circumference of 17 in. at



HUGE ELEPHANT

BROUGHT DOWN IN ITS THIRD CHARGE BY A WELL-AIMED SHOT

BY CARL E. AKELEY



ACACIA TREE OF 15 INCHES DIAMETER

BROKEN DOWN BY AN ELEPHANT

COURTESY OF CARL E. AKELEY

its end. The interior has been scraped down until the walls are as thin as those of a fine violin, thus making the trumpet so resonant that it must emit a fearful and ear-piercing sound if an energetic blast is blown through it.

A queer native African name, or we should perhaps rather say designation of ivory, is reported by an English officer in the Sudan. When a native comes to the barracks with ivory articles for sale, and is asked "Is this ivory?" he first points to his teeth, then puts his hands together at the side of his face and says "Dead elephant," this term being in general use among these natives for ivory. The material is worked in Omdurman on a turning lathe, the workman sitting cross-legged on the ground; the lathes used are quite similar to those employed in England. The Bahr-el-Ghazal province, with an area of about five times that of England, is plentifully supplied with elephants. Before the great war, the best ivory here commanded a price of 5,000 piastres (\$220) a *kantar* (99.05 lbs.), but at present the price is commonly 4,000 piastres (\$176) for this quantity. The merchants send it to Europe, excepting the broken or small pieces which are utilized by the turners of Omdurman, the very best of the inferior material bringing but ten shillings a pound. A native stated that for an elephant tusk weighing 2 lbs. 10 oz. he had paid but 60 piastres (\$2.64).*

The two longest tusks preserved of the present Indian elephant constitute a pair in the Royal Siamese Museum in Bangkok, Siam. Of these the one of greater length measures on the outside curve 9 ft. 10½ in., with a circumference of 15½ in; the shorter one is 9 ft. long, its circumference being nearly as great, namely, 15¾ in; the weight is not given. Another fine pair came from Assam and was owned by the late Lord Bulwer Lytton. The right tusk had a length of 8 ft. 9 in. and a circumference of 17¼ in., with a

*Communicated by F. W. Feavearyear, of the British Army.

weight of 81 lbs.; the left tusk was slightly shorter, 8 ft. 2 in. in length, the weight being almost the same, 80.2 lbs., giving a combined weight of 161.2 lbs. The heaviest, though not the largest of the Indian tusks reported in Mr. Rowland Ward's valuable record, were two from Burma acquired by the Marquis of Waterford. The respective dimensions and weights of the members of the pair are given as follows: length 7 ft. $3\frac{3}{8}$ in., circumference $17\frac{1}{2}$ in., weight 102 lbs.; length 7 ft. $3\frac{1}{4}$ in., circumference $17\frac{1}{8}$ in., weight $97\frac{1}{2}$ lbs.; combined weight $199\frac{1}{2}$ lbs. The tusks are especially interesting, as they belonged to the sacred white elephant of King Thibaw. In another Burma pair the tusks each had a circumference of $18\frac{3}{4}$ in., but only measured 6 ft. 8 in. and 6 ft. 5 in. in length, respectively; the joint weight was 167 lbs. These data show how much shorter and lighter are the very largest of the Asiatic tusks as compared with those of the same class from Africa.

Several remarkable carved ivories are in the Memorial Museum in Golden Gate Park, San Francisco. One of the finest is an ivory sword hilt and sheath, the blade having been forged by Munechika, an armourer of Japan, who flourished about 986 A. D. The design carved on the ivory hilt shows a Rakan, one of the sixteen most learned disciples of the Buddha. The bushy eyebrows characteristic of these Rakan figures are here so finely wrought that they stand out from the head like white thread. The scabbard bears an image of Benten, the Goddess of Purity and Love; beneath this figure is another Rakan with an attendant. In the Natural History department of the Museum are twenty-five ivory tusks decorated with "scrimshaw" work by American sailors, and in the Indian Room are forty-five tusks carved by Eskimos. Besides these American curios the Indian Room contains Oriental ivories collected by the late John Bardwell, who began his collection

in 1852. The Jewel Hall has on exhibition twenty-five examples of European ivory carving.*

Japanese ivories are well represented in the fine collections illustrating Oriental art formed by Alfred O. Deshong, and to be placed in the new museum in course of erection in Deshong Park, Chester, Pennsylvania. There are here from fifty to sixty large examples of Japanese ivory carving, comprising groups, single figures, carved tusks, scabbards, sword hilts, etc., many exhibiting considerable artistic power. Notable among them are several carved tusks, one of which offers the image of Amida, the "Buddha of Endless Life," seated on a lofty throne and attended by temple guards armed with long spears. Another tusk shows a figure of the Bodhisattva Kwan-non, the divinity in greatest favour in Japan and China. Both of these tusks have seal marks, and inscriptions signifying "Great Empire of Japan," and also the carver's name, Sekine Harumichi.†

Although elephants have on occasion made use of their tusks as weapons of offence or defence, the latter use finding expression in the French word for a tusk, *défense*, still their downward trend makes it difficult for the elephant to thrust with them. Neither, in spite of the elasticity and relative strength of ivory, are the tusks as strong as we might suppose. One who had an intimate acquaintance with the condition of the Cinghalese elephants relates that when one of the rare tuskers of the island attacked another elephant, which was unprovided with these weapons, the latter wound its trunk around one of its adversaries' tusks and snapped off a piece nearly 5 in. in diameter, about 2 ft. long, and weighing from 20 to 30 lbs.‡

*Communicated by George H. Barron, Curator of the Memorial Museum, Golden Gate Park.

†Communicated by Mr. John Getz.

‡Sir J. Emerson Tennent, "Sketches of the Natural History of Ceylon," London, 1861, pp. 80, 81, 86.

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TUSKS OF EXTINCT ELEPHANT SPECIES

LENGTH		GREATEST	WEIGHT	LOCALITY	SPECIES	OWNER
OUTSIDE	CURVE	CIRCUM- FERENCE				
ft.	in.	in.	lbs.			
16	6	...	...	Near Mexico City.	<i>El. imp.</i>	Instituto Geologico, Mex- ico City.
16	6		...			
13	9		498	Dallas, Texas.	<i>El. imp.</i>	Peabody Museum, Cam- bridge, Mass.
13	7½	22½	186	Kolyma River, Si- beria.	<i>El. prim.</i>	Imp. Mus. Nat. Hist., Pet- rograd.
(chord 6 ft. 11½ in.)		...				
12	10	22	167			
(chord 7 ft. 4½ in.)		..				
13	6	23	...	Victoria, Texas.	<i>El. imp.</i>	Am. Mus. Nat. Hist., N. Y.
12	11	21	201	Siberia.	<i>El. prim.</i>	Am. Mus. Nat. Hist., N. Y.
12	10	..	...	Alaska.	?	?
12	8	..	...	Siberia.	<i>El. prim.</i>	Hon. Walter Rothschild.
12	7*	..	217	Alaska.	<i>El. col.</i>	J. D. Beekman
12	6	23	...	?	?	Brit. Mus. Nat. Hist.
12	4½	21	...	Jonesboro, Ind.	<i>El. prim.</i>	Am. Mus. Nat. Hist., N. Y.
12	5	30	...	Campbell, Franklin	<i>El. col.</i>	Univ. of Neb. Museum.
12	5	30		Co., Neb.		
12	3	..	...	Steinheim, Würt- temberg.	<i>El. ant.</i>	Königl. Naturaliencabinett, Stuttgart.
12	2	22½	...	Red Willow Co., Neb.	<i>El. prim.?</i>	Univ. of Neb. Museum.
12	1½	..	...	Steinheim, Würt- temberg.	<i>El. prim.</i>	Königl. Naturaliencabinett, Stuttgart.
12		19	...	?	?	Hon. Walter Rothschild.
11	9	35	330	?	?	Milan Museum.
11	5	17½	...	?	?	Hon. Walter Rothschild.
11	4	20½	...	?	?	} Cut for piano keys.
11	3	20½	165½	?	?	
10	6	17½	124½	?	?	
10	4	...	123½	?	?	
11	..	20½	173	Siberia.	<i>El. prim.</i>	Sir Edmund G. Loder, Bart.
10	6	20	...	Borna, Saxony.	<i>El. prim.</i>	?
10	6	..	...	Ilford, Essex, Eng.	<i>El. prim.</i>	Brit. Mus. Nat. Hist.
10	6	21	...	Gosper Co., Neb.	?	?
10	6	21				
10	.	...	...	Tilloux, dept. Cha- rente, France.	<i>El. merid.</i>	Mus. Nat. Hist., Paris.
9	9	...	...	Siwalik Hills, India.	<i>El. (Steg.) ganesa</i>	Brit. Mus. Nat. Hist.
8	10½	25½	...	Steinheim-on-the Murr, Württem- berg.	<i>El. prim.</i>	Königl. Naturaliencabinett, Stuttgart.
(chord 4 ft. 5½ in.)						
8	8½	26				
(chord 4 ft. 3½ in.)						
8	10	23	...	Farmington, Conn.	<i>Mast. am.</i>	?
8	6	...	...	nr. Newburg, N. Y.	<i>Mast. am.</i>	Am. Mus. Nat. Hist.
6	3	23	...	Yorkville, Ill.	<i>Mast. am.</i>	Field. Mus. Nat. Hist.
(chord 3 ft. 7 in.)						

*Broken in transit.



FOSSIL ELEPHANT TUSKS

FROM THE LENA RIVER, SIBERIA, RANGING IN WEIGHT FROM 50 TO 160 POUNDS. PART OF A SHIPMENT OF 90,000 POUNDS, USED AT A DEEP RIVER, CONNECTICUT, IVORY WORKS.

As a proof of the great number of very large-sized mammoth tusks brought recently from the Lena River district in Siberia, we give the following list made up from a single shipment to a New York house, and stating the weight in avoirdupois pounds of those tusks exceeding 100 lbs. in weight:

225	(2)	155½	122
221		147	119½
201½		144	116
201		142	112½
182		132	110
180½		131½	107½
174	(2)	125½	106½
168½		125	105½
166½		124½	105½
165½	(2)	123½	105
163½		123	104½

TUSKS OF ASIATIC ELEPHANTS

LENGTH		GREATEST	WEIGHT	LOCALITY	OWNER
OUTSIDE	CURVE*	CIRCUM-FERENCE			
ft.	in.	in.	lbs.		
9	10½	15½	...	?	Royal Siamese Museum, Bangkok.
9	..	15½	...		
8	9	17½	81	Assam.	The late Earl of Lytton.
8	2	...	80.2		
8	9 }	...	...	Burma.	Government House, Rangoon.
8	6 }	...	...
8	0	16½	90	S. India.	Sir Victor Brooke's Collection.
7	9†	17	...	Burma.	Royal Palace, Mandalay.
7	6	15½ }	...	Sumatra.	G. F. W. Curtis.
7	0	14½ }	...	Sumatra.	
7	4½	18½	85	Assam.	T. H. Monteath.
7	3½	17½	102	Burma.	Marquis of Waterford.†
7	3½	17½	97½		
6	11	15½ }	...		
6	6	15½ }	106	Do.	R. Gordon Smith.
6	10	17½	65½	India.	Bethnal Green Museum (J. D. Goldingham.)
6	8	18½	84	Burma.	H. Shaw Dunn.
6	5	18½	83		

*This list and the following one of tusks from African elephants are taken from Rowland Ward's "Records of Big Game," 7th ed., edited by R. Lydekker and J. B. Burlace, London, 1914, pp. 479-486, several additions having been made here.

†Exposed from the socket.

‡The tusks of the sacred white elephant from King Thibaw's Palace, Mandalay.

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LENGTH		GREATEST	WEIGHT	LOCALITY	OWNER
OUTSIDE	CURVE	CIRCUM-FERENCE			
ft.	in.	in.	lbs.		
6	7½	14½	52½	Mysore.	Viscount Powerscourt.
6	7	12½	46½	Yala, S. Provinces, Ceylon.	Lieut.-Col. R. J. Marker.
3	11½	12½	29½		
6	6	...	73½	Burma.	A. E. S. Minett.
6	4	...	71½		
6	4	...	...	Assam.	G. H. Moore.
6	3½	...	73½	Madura District.	British Museum.
6	2	16½	58	North Coimbatore.	Rev. H. C. B. Stone.
5	11½	12½	56½		
6	1	17½	56½	Assam.	Noel Williamson.
5	11½	17½	53½		
6	1	16½	48½	Burma.	E. M. Alexander.
5	10	16½	42		
6	0½	...	109	S. India.	F. Gompertz
5	8				
6	0	...	50	Madras.	J. Fortune.
5	11	16	45	Bengal.	H. K. Robinson.
5	10	16	46½		
5	10	...	...	Borneo.	C. M. D. Stewart.
5	3	15	42	Ceylon.	W. S. Murray.
4	10½	13½	28	Malaya.	J. Scott Mason.
4	7½	13½	27		

TUSKS OF AFRICAN ELEPHANTS

11	5½	18	} 293	East Africa.	New York Zoölogical Society (See illustration.)*
11	0	18½			
10	9	...	173	?	Ronalsyn Gordon Cummings.†
10	4	18½	126		
9	7	19	123½	Mongalla.	H. R. H. the Duc de Montpensier.
10	2½	24½	226½		
10	2	...	159	Marsabit.	British Museum.
10	...	...	216	East Africa.	F. J. Watson Taylor.
9	10	19½	} 247	Do.	Messrs. Joseph Rodgers & Sons.
9	5	19			
9	5½	18½	120	Tana Valley.	Charles Pulley.
9	0	18½	117		
9	5	22½	184	?	Major H. De Prée.
9	4	20½	160		
9	4	17½	93	East Africa.	Sir Edmund G. Loder, Bart.
8	11½	17	?		
9	4	18	110	Belgian Congo.	Sir John Kirk.
(tip broken)				Do.	James Barnes.
9	4	...	151	Elgayu, East Africa.	Duke of Westminster.
9	4	22	156½	Uganda.	Sir F. J. Jackson.
9	1	22½	168½		
9	3½	18½	...	Tana Valley.	R. Grauer.
9	3	...	129	East Africa.	Sir Robert Harvey, Bart.
9	2½	20	...	Tana Valley.	Sir F. J. Jackson.
					Sir Robert Harvey, Bart.

*Presented by the late Charles F. Barney, Esq.

†Ronalsyn Gordon Cummings, "Five Years of a Hunter's Life," New York, 1850, Vol. I, p. 263.

ELEPHANT TUSKS

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LENGTH OUTSIDE CURVE		GREATEST CIRCUM- FERENCE	WEIGHT	LOCALITY	OWNER
ft.	in.	in.	lbs.		
8	2	24	340	Uganda.	Capt. H. S. Burrough.
8	5	24	176	Do.	Capt. E. B. Place.
8	1½	24	179½	Do.	
8	9½	24	114	East Africa.	Col. A. Eric Smith.
8	1	19	108		
8	10½	19	161	Tana Valley.	His Majesty King George V.*
8	0	21	167	West Africa.	H. J. Heinz.
8	11	22	390		
8	...	...	139	Uganda.	Frankfort Museum. Shot by the
8	0	21½	141		late G. G. Longden.†
8	6	21½	198	Central Africa.	Major P. H. G. Powell-Cotton.
8	0	25	174		
8	11	23½	130	East Africa.	J. Elkington.
8	0	21	124		
8	10	21	171	Congo.	?
8	0	...	171		
8	6	...	130	Do.	N. C. Cockburn.
8	11	20	124½		
8	8½	19½	110	Mt. Elgon, E. Africa.	Lieut.-Col. J. D. Ferguson.
8	11	18½	108		
8	9	18½	105	East Africa.	Lord Delamere.
8	10	18	102	Tana Valley.	Major H. De Prée and Capt. C. Hankey.
8	9½	...	91		
8	0	...	90	East Africa.	Sutton Tinmia.
8	9½	17	92		
7	11½	17½	104	Do.	G. M. Norrie.
8	9	19½	100		
8	3½	19½	165	Do.	His Majesty King George V.
8	7½	22½	315	Africa.	Messrs. Joseph Rodgers & Sons, Ltd., Sheffield, England.
8	7	...	78½		
8	7	...	78½	Congo.	Duke of Penderanda.
8	6	17½	167		
8	6	17	165	?	W. S. Cherry, Col. Los Angeles Co., Museum.
8	5½	20½	80½		
8	3	20	79	Do.	Sir. A. Sharpe.
8	5½	17½	175	Uganda.	Graham Pownall.
8	0	17½	139½		
8	5	23½	137	Bahr-el-Gebel.	Major R. M. Sanders.
8	5	19½	99½		
8	1½	19½	96½	Sudan.	Capt. E. C. Hamilton.
8	4½	19	97½		
7	6	18	91	B. E. Africa.	Capt. W. H. Wilkin.
8	4½	18½	207	East Africa.	Bought by Ludwig II of Bavaria.
8	4	...	88½	East Africa.	W. Neilson.
8	4	17½	76	M' bogo.	E. S. Grogan.
8	4	...	150	Near Wadella.	W. Y. Wyndham.
8	4	21½	147		
8	3	21	98		
8	3½	...	94		Duke Adolf Friedrich of Mecklenburg.
8	2½	...			

*Presented by H. H. the Aga Khan.

†Presented by Rudolf de Goldschmidt.

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LENGTH OUTSIDE CURVE		GREATEST CIRCUM- FERENCE	WEIGHT	LOCALITY	OWNER
ft.	in.	in.	lbs.		
8	3	18½	81½	East Africa.	Capt. T. W. Greenfield.
8	2	18½	80		
8	3	18	...	Africa.	Brunswick-Balke-Collender Co
8	1½	17½	...		
8	3	22	135½	Sudan.	Sir W. Garstin.
7	11	23½	159½		
8	2	20½	145	Gondokoro.	His Majesty the King.
7	8½	20½	121		
8	1	17½	86	?	Major G. G. P. Humphreys.
..	..	...	129	Belgian Congo.	W. Sewall.
..	..	...	124		
8	1	16	...	East Africa.	Capt. C. J. Murray.
7	2	16	...		
8	1	20½	110	Abyssinian Sudan.	W. N. McMillan.
8	0	20	108		
8	}	...	...	Belgian Congo.	Musée du Congo, Tervueren, Bel.
8		...	...
8	0	20	118	Uganda.	Capt. C. H. Stigand.
7	8½	19½	106½		
7	11*	19½	98	Sierra Leone.	Major C. E. Palmer.
7	8½	20½	138		
7	11	17½	90	White Nile.	Capt. E. R. Wishaw.
7	0	17	80		
7	10½	20	113	Upper Nile.	Douglas McDouall.
7	5½	20½	108		
7	10	17½	85	East Africa.	C. Bower Ismay.
7	6½	17	81		
7	10	16½	63	Do.	R. Holmes.
7	8½	16½	68½		
7	9	17½	95½	Do.	P. Niedieck.
7	9	22	119	N. E. Rhodesia.	F. H. Melland.
7	8½	20½	110		
7	9	22½	268	Lake Rudolf.	A. E. Butter.
7	7	21½	...	Lake Naivasha.	T. W. Brooke.
7	7	16½	...		
7	6	16½	...		
7	6½	19½	101	S. Abyssinia.	J. R. Luchsinger.
6	9½	19	91		
7	½	18½	81	Brit. East Africa.	Lieut. A. H. Wheeler.
7	..	18½	79		
7	6½	17½	78½	Congo.	R. de la Huerta.
7	2	...	75½		
7	6	20	103	East Africa.	Col. Max C. Fleishmann.
6	9	19½	93		
7	6	17½	76	Uganda.	H. Leney.
6	11½	18	81		
7	5½	18	85	Sudan.	Major A. W. Jennings Bramly.
7	5	18½	80		
7	5	19½	84	Do.	Major H. D. Pearson.
7	5	22½	114	Lado.	Capt. R. S. Hart.
7	2	23	112		
7	4½	20	92½	Uganda.	J. Jay White.
7	4½	19½	91½		

*In Hon. Walter Rothschild's Museum at Tring.

LENGTH		GREATEST		WEIGHT	LOCALITY	OWNER
OUTSIDE	CURVE	CIRCUM-	FERENCE			
ft.	in.	in.	lbs.			
7	3	18½	70	}	Sudan.	John H. Prentice.
7	2	18½	68½			
6	3	19	64	}	Sudan.	John H. Prentice.
6	1	19	58½			
7	2½	18½	87	}	Abyssinian Sudan.	C. Bulpett.
6	7	18½	85			
7	2	...	168	}	East Africa.	N. Y. Zoölogical Soc., Nat. Col. of Horns.
7	2	...				
7	2	19½	88	}	Uganda.	G. M. Norrie.
6	10	19	77			
7	2	17½	81½	}	Sudan.	Countess of Sefton.
6	7½	17½	80½			
7	0	21½	93	}	Uganda.	G. Blaine.
7	0	21½	91			
6	10½	17½	65	}	N. Nigeria.	Capt. G. C. Kelly.
6	0	17½	59½			
6	10	22	112	}	Uganda.	G. M. Norrie.
6	4	22	103			
6	8	18½	73½	}	East Africa.	Amasa Stone Mather.
6	3	18½	68½			
6	7	16½	...	}	Southeast Africa.	F. C. Selous.
6	7	17½	73			
6	0½	17½	72½	}	N. E. Rhodesia.	Hon. M. W. Elphinstone.
6	6	18½	57			
6	4½	18½	63½	}	S. E. Africa.	P. Neergard.
6	6	...	...	
6	4	15½	...	}	B. C. Africa.	R. H. Storey.
6	5½	12½	...			
6	3	23	176	}	N. of Lake Rudolf. Uganda.	The late A. H. Neumann. Nat. Museum, Dublin.*
6	2½	18½	...			
5	7½	18½	...	}	Lomagundi's Country.	Duke of Westminster.
6	...	16½	56			
5	9	16	52	}	East Africa.	James L. Clark.
5	11½	...	40			
5	10½	...	39	}	Uganda.	Capt. E. B. Place.
5	0	14½	49			
4	8	14½	47	}	Abyssinia.	A. E. Butter.
4	11	15	26			
4	9½	14½	33½	}	Somaliland.	A. H. Straker.
4	8½	13½	...			
4	5	12½	...	}	Do.	Major E. W. S. Brooke.
4	4	13½	6			
3	0	9	...	}	Do.	Sir Edmund G. Loder, Bart.
3	0	9	...			
3	0	9	...	}	Port. E. Africa	Lord Delamore.
3	0	9	...			
3	0	9	...	}	Port. E. Africa	Lieut.-Col. J. McCall Maxwell.
3	0	9	...			
3	0	9	...	}	Port. E. Africa	Dr. Louis L. Seaman.
3	0	9	...			

The following specimens probably belong to the Dwarf Congo race (*E. africanus pumilio*):

5	6	13½	27½	}	Semliki.	G. Blaine.
5	4	13½	27½			
3	8	12	17	}	Umfumbro, E. Congo.	Major J. Webb Bowen.
3	7½	12½	17			
2	11	8½	7½	}	Umfumbro, E. Congo.	Major J. Webb Bowen.
2	11	8½	8			

*Presented by Graham Pownall.

CHAPTER XII

THE COMMERCE OF IVORY

THE Arab traveller Soleiman, writing in the ninth century, notes ivory among the principal articles imported into the port of Canton for distribution in China; the others were frankincense, copper, tortoise-shell, camphor, and rhinoceros horns. Three tenths of the merchandise was kept by the Chinese Government as import duty, the balance being turned over to the merchants to do as they pleased with.* The same writer remarks that the Chinese women adorned their heads with a number of small combs of ivory and other materials, as many as a score of these being sometimes worn together.†

Those who imported ivory into China by way of Canton in the ninth century of our era were not only forced to yield the high import dues we have noted, but were forced to sell all tusks weighing 30 catties or more (about 40 pounds or upward) in the official market, where there was commonly great undervaluation. Of course the consequent exclusion of competition must have been felt as a great hardship. To escape this restriction but one way was open: to cut up the heavier tusks so that each separate piece would weigh less than the limit set for the official market. Any attempt to evade the strict customs regulations was severely pun-

*Chau Ju-Kua, "Chu-fan-chi" ("A Description of Barbarous Peoples"), trans. by Friedrich Hirth and W. W. Rockhill, St. Petersburg, 1911, p. 15.

†"Ancient Accounts of India and China by Two Mohammedan Travellers," Engl. trans. of Renaudot's French version, London, 1733, p. 14.

ished. Should any trader remove the smallest object from the ship's cargo, the whole cargo was confiscated and, over and above this, the guilty trader was punished in an exemplary manner.*

From Marco Polo's accounts, the ivory market in Zanzibar flourished in the thirteenth century, for, treating of Madagascar and Zanzibar, he asserts that there were more elephants there than in any country in the world, and he adds: "The amount of traffic in elephants' teeth in these two islands is something astonishing." Although, from certain errors in his description of this region, he appears to have derived his facts at second hand and confused some of his data, this statement in regard to the ivory traffic of Zanzibar is almost unquestionably correct. One of his erroneous assertions in reference to elephants here is interesting enough in itself to be cited, more especially as it was undoubtedly true for other regions. This is that the natives, when about to bring up a war elephant to the attack, would "ply him well with their wine," until he was half drunk. In this state of semi-intoxication the animal was fiercer and bolder than when sober, and his attack was more impetuous. This can, however, scarcely refer to Zanzibar, for the trustworthy Arab writer, Mas'udi, definitely asserts that elephants were not tamed or trained there in any way, and that the natives only hunted them to kill them.†

Although many of the ancient trade routes have been abandoned for one reason or another, still in a number of cases the old order of things has been maintained with but little change. In the ivory trade, for instance, the port of Aden on the coast of Arabia, at the entrance to the Red

*Chau Ju-kua, "Chu-fan-chi" ("A Description of Barbarous Peoples"), transl. by Friedrich Hirth and W. W. Rockhill, St. Petersburg, 1911; introduction, p. 21.

†The Book of Ser Marco Polo the Venetian, transl. and ed. by Col. Henry Yule, London; 1875, Vol. II, pp. 404, 416; note p. 418.

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Sea and commanding the Strait of Bab-el-Mandeb, is to-day, as it was centuries ago, a centre of distribution for East African ivory. Vessels came hither in medieval times from all parts of the world, and among the innumerable articles of commerce were elephants' tusks from Abyssinia, which land furnished an immense supply of elephant ivory.* Aden is now strongly fortified and has been called the "Gibraltar of the East."

There can be little doubt that, as a general rule, the European supply of ivory was mainly, though perhaps not exclusively, derived from Africa. It is true there appears to be good evidence that in certain periods a considerable quantity of elephant tusks were brought from India, but in spite of the express statements to this effect made by the Venetian traveller, Marco Polo, and others, it is not unlikely that what they believed to be Indian ivory had originally come from Africa and either been transshipped from some Indian port, or shipped at some African port, or one in touch with Africa, by Indian trading vessels. Indeed, the older writers, beginning with Cosmas Indicopleustos, insist upon the large quantity of African ivory imported into India, and as late as the sixteenth century we are told by Garcias ab Horto that the annual importation amounted to 600,000 pounds, probably an excessive estimate. Several considerations, besides the active native industry in ivory working, conspired to this end. In the first place the tusks of the African elephants are, on the average, both larger and heavier than are those of the Indian elephants, and they are present with the females as well as the males of the species; then, in medieval and later times, these animals have been domesticated and trained in a great variety of ways in India, whether as war elephants, as

*W. Heyd, "Histoire du commerce du Levant au Moyen-Age," French edition, Leipzig, 1886, Vol. I, p. 35.

beasts of burden, or in hauling and carrying materials for construction, etc. Moreover, in many parts of India and the contiguous countries in which elephants are to be found, religious superstition has sometimes invested them with a quasi-sacred character. Hence elephant hunting, not for the purpose of capturing and training the animals, but merely to kill them and cut out their tusks, while actively pursued for many centuries in Africa, has been carried on but rarely in India, the native Indian ivory coming almost invariably from animals which have died a natural death, and as the elephant is exceptionally long-lived, the supply from this source has been limited.*

The commerce in ivory in the interior of Africa is now carried on by caravans under the conduct of Negroes or Arabs, the funds being furnished by the European or Hindu merchants, as it very rarely happens that the leader of the caravan operates with his own resources. The German product is chiefly shipped from Bagawayo, Saadani, and Pangani; the posts for British ivory are Mombasa, Lamu, and Kismayu. While Bagawayo was formerly the most important of the posts, Mombasa has recently made very rapid headway.†

Statistics show that about 1830 the average imports of ivory into Great Britain totalled 462,000 pounds; of this 330,000 were retained for home consumption. Even at this time it was feared the breed of elephants was threatened with extinction, owing to the wholesale slaughter of these animals. England's supply came from the west and east of Africa, the Cape of Good Hope, Ceylon, India, and the countries to the eastward of the Straits of Malacca. In 1831 West Africa furnished Great Britain with 288,400

*W. Heyd, "Histoire du commerce du Levant au Moyen-Age," French edition, Leipzig 1886, Vol. II, pp. 629, 630.

†"La Belgique Coloniale," Vol. II, p. 617, 1897.

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pounds of ivory, the Cape sending only 22,170 pounds; from India came 243,300 pounds. At this time the Chinese drew their supply from Malacca, Siam, and Sumatra (probably also from Ceylon). The work of Chinese ivory carvers seems to have been more highly appreciated in Europe about 1830 than it is to-day, as our authority says: "The preparation of this beautiful material is much better understood by the Chinese than by any other people." The undoubted ingenuity and technical skill of the Chinese carvers seems to have caused many to overlook their artistic shortcomings.*

The following prices of elephants' tusks per hundred-weight (112 pounds) are listed for the London market in December, 1833; they include a duty of \$5 per hundred-weight:†

								RANGE OF PRICE						
								£	s	d		£	s	d
1st	79 to 90	lbs.	.	.	.	.	.	29	0	0	to	31	0	0
2d	56 to 78	"	.	.	.	.	.	25	0	0	to	28	0	0
3d	38 to 55	"	.	.	.	.	.	23	0	0	to	26	0	0
4th	28 to 37	"	.	.	.	.	.	20	0	0	to	24	0	0
5th	18 to 27	.	.	.	.	.	.	18	0	0	to	21	0	0
Scrivelloes	.	.	.	.	.	.	.	14	0	0	to	35	0	0
Sea-horse teeth	.	.	.	.	.	.	.	0	0	0	to	5	0	0

The size of the tusks of course affects the value of the material, as the larger the pieces of ivory, the wider the range of use. All tusks weighing less than 18 pounds were designated "scrivelloes."

As with other commodities, the price of ivory has had wide fluctuations. In illustration of this we may take the average figures per hundredweight for the quarterly sales of billiard ball pieces of all grades in the London

*J. R. McCulloch, "A Dictionary of Commerce," London, 1837, pp. 737, 738.
†McCulloch's "Dictionary of Commerce," new ed., London, 1837, p. 737.

salesrooms in Mincing Lane during certain years, as follows:

1870	.	.	.	.	.	.	.	.	.	.	.	£155
1880	.	.	.	.	.	.	.	.	.	.	.	90
1890	.	.	.	.	.	.	.	.	.	.	.	112
1900	.	.	.	.	.	.	.	.	.	.	.	68
1905	.	.	.	.	.	.	.	.	.	.	.	167

The prices for less valuable material followed this general trend. Ivory always commands full value; for there is little or no material wasted, even the dust being available for polishing, for making India ink, or for the making of "ivory jelly."

The progressive increase in sales in the London market is shown by the fact that toward the close of the eighteenth century they totalled something less than about 192,000 pounds annually, on an average, while in 1837 they had risen to 364,784 pounds, and had reached 1,000,000 pounds in 1864. According to the London Board of Trade figures, 1,434,900 pounds of ivory were imported in 1890; 1,091,100 pounds in 1895; while the figures declined to 988,900 pounds in 1900 and to 904,500 pounds in 1904.

Bombay secures the main part of its supply of ivory from Zanzibar, Mozambique, and Aden. The total imports for the year 1883-4 were 462,403 pounds, of which 197,866 pounds were exported again, principally to London (167,150 pounds). Of the imports Zanzibar furnished 178,278 pounds, Mozambique 109,327 pounds, and Aden 49,730 pounds; from England came 98,463 pounds. A good average tusk weighs about two maunds, something over 57 pounds, and sells at the rate of 250 rupees (\$80) per maund. Zanzibar ivory pays an import and export duty to the Sultan of the country amounting to 25 rupees (\$8) per maund (about 29 pounds). On every tusk put through the custom house the Sultan's seal is cut when the duty has

been liquidated. The ivory received in Bombay is not exported in the form of tusks, but the latter are cut up and the parts variously distributed. To Europe go the solid tips especially well adapted for the manufacture of billiard balls, and also the bases of the hollow shaft of the tusks, known as "bamboo ivory." For home consumption the middle part of the tusk is reserved; this is called *churdar*, from its use in the making of *churis*, or bangles; China receives a small amount of an inferior material. A somewhat curious circumstance is that those who cut up the tusks do not receive any remuneration in money, although the employer furnishes the requisite tools, but they are allowed to keep the ivory dust, for which they find purchasers among cattle raisers, who believe that milch cattle will secrete milk more abundantly if they be given a solution of ivory dust. Another use (in Northern India) is as a tonic medicine.* A recent ordinance provides that in the State of Mysore all elephant tusks shall be sold at public auction by the district treasury officer, at Bangalore, once every year.†

The internal commerce in ivory is mainly carried on by Marawis, who furnish the stocks for the chief markets, Palee in Jodhpur, Surat in Guzerat, and Amritsar in the Panjab. This last-named mart supplies in its turn the material for the Delhi comb makers and for the inlayers of Dera Ismail Khan, while a good part of the ivory is kept in Amritsar where the small combs worn by the Sikhs are produced in great quantity. These combs constitute an important article of masculine dress among the Sikhs, as the religious regulations do not permit the men to cut their hair, and it has to be carefully bound up and kept in place by a comb beneath the turban. Strange to say,

*J. L. Kipling, the *Journal of Indian Art*, Vol. I, No. 7, p. 49, July, 1885.

†Consul Henry D. Baker of Bombay, India, "Report on Ivory and Elephants in India," June 8, 1914.

the Marawi traders, as they belong to the religious sect of the Jains, are not able to come into direct contact with the elephant tusks, because the touching of an animal substance constitutes a pollution. Hence the material in which they deal must be handled and weighed by Mohammedans in their employ.*

The striking change in the location of the chief distributing point in Europe for ivory is exemplified by a comparison of statistics for 1908, and for a date twenty years earlier. While at the earlier date the annual sales of ivory were 373 tons in London and but 6 tons in Antwerp, in 1908 sales on the London market had fallen to 214 tons, while in Antwerp 227 tons of ivory were sold. This change in markets is of course directly due to the large exportation in recent years from the Belgian Congo.†

The German territory of Cameroon in Central Africa has furnished a small, but recently a decreasing, supply of ivory. The figures for 1910, when 38 tons of the material were exported, show a decrease of 16 tons from those of the previous year, the value falling off from \$219,705 to \$156,395. The prohibition to shoot young elephants, rendered imperative in order to save the breed from extinction, has been often violated by the natives, who have smuggled the tusks they obtained across the French Congo. It appears that with the annexation of what is called the "New Cameroon" territory, recently ceded by France to Germany in connection with the Morocco arrangement, the export of ivory from Cameroon will increase, for a German sportsman came across many elephants on a trip lately made to this newly acquired territory, although he had failed to find any in the old Cameroon territory.

In German East Africa there has also been a falling off

*J. L. Kipling, the *Journal of Indian Art*, Vol. I, No. 7, p. 50, July, 1885.

†*Scientific American*, Supplement No. 1752, p. 79, July 31, 1909.

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in ivory exports for 1910 and 1911 from the higher figures for 1909. By some it has been stated that this results from a decrease in the number of “large tuskers,” but others believe that the diminished supply is rather due to the enforcement of a new game law for the protection of elephants toward the end of 1911. The chief port for ivory exports here is now Dar-es-Salaam, Bagawayo having lost its earlier primacy in this respect. As an intermediate centre for ivory Zanzibar has not maintained its rank, the volume of trade in ivory here having fallen from £45,000 in 1909 to but £28,900 in 1910.

The following figures present the statistics of ivory exports from German East Africa for the years 1906–1911, the weight being given in avoirdupois pounds and the value in pounds sterling:*

	W E I G H T P O U N D S	V A L U E
1906	48,058	£ 24,290
1907	42,672	21,669
1908	56,647	33,169
1909	62,471	30,291
1910	114,540	51,310
1911	79,905	37,154
	<u>56,863</u>	<u>24,270</u>
	461,151	£ 222,153

Indicating an average export value per pound of about \$2.34 of our money.

Aden, long so important as an ivory market, has lately lost much of its trade in this material. The rapid decrease in ivory imports is shown in the following figures:

1909–1910	177,225 pounds
1910–1911	127,760 “
1911–1912	54,942 “
1912–1913	25,630 “

*Diplomatic and Consular Reports (British), No. 5171 Annual Series. Germany, Report for the years 1909-1912 on the Trade, Commerce, and General Economics Position of German East Africa, London, 1913, pp. 26, 27.

The entire stock on hand, early in 1914, was but 8,000 pounds, and this was held in the anticipation of obtaining better prices later on. The fact that most of the ivory from the Sudan is now shipped either directly overland or by way of Jibati is cited as one of the principal causes of Aden's loss of ivory trade. Another cause is stated to be the lapsing of a contract accorded by the late Negus of Abyssinia, giving to one of the leading ivory dealers of Aden an option upon Abyssinia's share of the ivory secured in these regions.*

In the French Asiatic colony of Laos each of the captive elephants, which are quite numerous, is provided with a duly registered card of identification, and if any owner of an elephant decides to sell the animal out of the country, he is obliged to pay half of the value into the local treasury. The price is said to vary, according to age, sex, degree of training, or length of tusks, from 600 to 1,500 piastres; ivory brings in Laos from 15 to 20 francs per kilogram.†

The Governor-General of French Equatorial Africa reported recently that while at the time the French first occupied this region a considerable stock of ivory existed there, this stock has been exhausted, and the ivory exports are now comparatively stationary, amounting to about 160 tons annually. As to a prospective increase of these exports, the Governor-General was not very sanguine, in spite of the fact that herds of from eighty to one hundred elephants are still occasionally to be met with in this territory.‡

Ivory, as well as hippopotamus teeth and rhinoceros horns, has for years been counted among the staple products of the British East African Protectorate on the Indian

**Daily Circular and Trade Reports*, April 21, 1914, pp. 397, 398.

†H. Jacob de Cordemoy, "Les produits coloniaux d'origine animale," Paris, 1903, p. 179.

‡Consul John Ball Osborne, of Havre, "French Equatorial Africa," *Daily Consular and Trade Reports*, May 23, 1913, p. 963.

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Ocean. Some of the ivory goes to London and a certain quantity is sent to the United States. The total value of the ivory exports from Mombasa, the seaport of the Protectorate, for the six months ending June 30, 1909, was \$170,876, of which sum \$68,178 represented the value of the Congo ivory shipped by way of this port.*

The strong competition of Mombasa has affected the trade of Zanzibar so unfavourably that even apart from the general demoralization due to the outbreak of war, this trade showed a falling off in 1914, and figures for the entire year, including the war period, are much lower than those for 1913. This is true of the ivory imports and exports as of those of other merchandise. Of course the imports of ivory are only made to re-export the material, Zanzibar being thus a mere port of transit. The value of these ivory imports and exports for the two years are given as follows:†

	IMPORTS	EXPORTS	WEIGHTS OF EXPORTS POUNDS
1913 . . .	\$166,792	\$193,962	68,729
1914 . . .	46,767	59,157	18,300
1914 (Decrease)	\$119,925	\$134,805	50,429

IVORY TRADE OF ZANZIBAR 1910-1914

	IMPORTS VALUE	EXPORTS WEIGHT, POUNDS	VALUE
1910 . . .	\$286,022		\$310,697
1911 . . .	323,796	156,046	402,512
1912 . . .	195,494	82,655	219,802
1913 . . .	166,792	68,792	193,962
1914 . . .	46,767	18,300	59,157

Ivory merchants claim that the elephants living on opposite sides of a lake in Africa, eleven miles long, although of

**Daily Consular and Trade Reports*, February 5, 1910, pp. 1, 5, 6.

†Consul Perry C. Hays, "Zanzibar," in *Suppl. to Commerce Reports* No. 78a; July 16, 1915.



A FORTUNE IN IVORY
EACH TUSK WORTH \$50 TO \$100; ZANZIBAR

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the same species, furnish ivory differing as much in quality as does Egyptian ivory from that of the Congo. Indeed, ivory of the same district will often vary greatly. While some Congo ivory is hard, brittle, white, and translucent, other material from the same region will be opaque, and soft in texture as that from Zanzibar; it may also be greenish tinted at the nerve-centres.

A large part of the trade in ivory imported to Europe is in the hands of two firms, Messrs. Hale & Sons of London and Messrs. Lansberger & Cie. of Antwerp, the latter house taking all the ivory from the Belgian Congo. The price of choice pieces of ivory in the London market is sometimes very high. For instance, while in 1908, \$453 per cwt. represented a record figure for whole tusks, \$750 per cwt. was paid for cut points especially suitable for billiard balls.

The general price-movement of ivory in the New York market during the past thirty-eight years is shown in the following figures, which note the weight of the ivory purchased at a given date in the year and the price per pound; this is only for the finest selected material, and not for an average quality:

DATE	WEIGHT OF IVORY IN POUNDS	PRICE PER POUND
1875, Oct. 15	128	\$3.55
1876, Sep. 22	125	3.25
1877, Oct. 18	84	2.90
1878, June 21	83	3.15
1879, Aug. 8	75	1.87
1880, May 7	50	2.50
1881, June 24	70	2.65
1882, Nov. 13	68	2.95
1883, Nov. 2	70	2.95
1884, Nov. 20	75½	2.82½
1885, Oct. 12	76½	2.75
1886, Oct. 5	80½	2.70
1887, Nov. 2	81	2.75
1888, Oct. 5	87	2.69

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DATE	WEIGHT OF IVORY IN POUNDS	PRICE PER POUND
1889, Sep. 25	75	\$2.76
1890, Nov. 14	79	2.92
1891, Oct. 3	73	2.69
1892, Aug. 31	82	2.46
1893, Apr. 25	79	2.15
1894, Sep. 19	77	2.06
1895, Oct. 4	83	1.85
1896, Apr. 13	78	1.80
1897, Sep. 9	77	2.06
1898, Mar. 14	78	2.20
1899, June 1	77	2.60
1900, Oct. 25	75	2.63
1901, July 5	90	2.52
1902, Oct. 30	98	2.58
1903, Oct. 14	87	2.69
1904, July 7	78	2.85
1905, Nov. 4	73	3.61
1906, July 26	55	3.10
1907, Apr. 8	94	4.00
1908, Mar. 12	92	3.83
1909, Feb. 19	105	3.65
1910, Feb. 18	96	3.44
1911, Jan. 9	111	3.78
1912, Mar. 12	122	3.84

As we have already stated, these relatively high prices have been paid for ivory of superior quality, such as is constantly in demand for the manufacture of billiard balls, of the finest toilet articles, etc. This is clearly brought out by the last entry in the list, noting the purchase of 122 pounds' weight of ivory at an average price of \$3.84 a pound, while at about the same time the average value per pound of the ivory imports was a trifle over \$2.50. On April 8, 1907, as high as \$4 a pound was paid although the average value of the imports for that year was \$3.10 a pound.

It will be noted that the price in 1912 is but 8 per cent. higher than it was in 1875, the intermediate fluctuations following, in the main, the general financial condition of the country.

As London is still recognized as a great ivory mart, although of late years the Antwerp sales of Congo ivory have attracted many buyers, English and Continental, the German ivory dealers having their main offices in Hamburg usually keep also a branch house in London. Of a total importation into Germany of 315.7 tons of ivory in 1912, 102 tons came from England. The various grades are specially named, tusks under 20 pounds' weight, for instance, being called *scrivelloes*; of these the tusks suitable for billiard balls are called "ball *scrivelloes*," the smaller ones being designated as "bagatelles," and others according to their form or quality "hollows," "cores," or "defectives." The London sales of April, 1913, were but 34 tons as against 45 tons in the same month of 1912. Importations from January 1 to March 31, 1913, amounted to 64 tons; for the same period in 1912, to 66 tons, while deliveries, 71 tons in 1913, were 85 tons in 1912. Stock in dock warehouses was greater in 1913 than in 1912, the respective figures being 72 tons and 62 tons.

As there is a constant demand for all varieties of ivory, and as the greater part of the buyers are excellent judges of form and quality, there is less tendency to violent fluctuations in the ivory market than in many others. It but rarely happens that the supply outruns the demand to any considerable extent or for any length of time.

The prices obtained for ivory at the spring sales in London April 23 and 24, 1913, show the following range for the different grades and classes of tusks:*

*Consul-General Robert P. Skinner, of Hamburg, "Ivory and Walrus Tusks in Europe," *Daily Consular and Trade Reports*, December 9, 1913, p. 1390.

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Zanzibar, Abyssinian, and East Indian teeth and scrivelloes, per hundredweight (112 pounds).

AVERAGE WEIGHT	SOFT SOUND	SOFT DEFECTIVE
80 pounds and upward	\$403.91—\$428.25	\$355.25
70 to 80 pounds . .	394.18	364.98
60 to 70 “ . .	374.72— 399.05	.....
50 to 60 “ . .	379.38— 389.05	340.65
40 to 50 “ . .	379.58— 394.18	330.92—364.98
30 to 40 “ . .	369.85— 389.32	316.32—330.92
20 to 30 “ . .	360.12— 369.85	301.72—330.92
10 to 20 “ . .	.....	257.92—296.85
5 to 10 “ . .	243.32— 262.79	218.99—248.19
3 to 5 “ . .	209.25— 233.59	194.66—199.52

Egyptian and Malta teeth and scrivelloes per hundredweight (112 pounds).

AVERAGE WEIGHT	SOFT SOUND	HARD SOUND
80 pounds and upward	\$389.32—\$408.78	\$326.05—\$330.92
70 to 80 “ . .	379.58— 394.18	282.25— 316.32
60 to 70 “ . .	374.72— 399.05	287.12— 291.99
50 to 60 “ . .	369.85— 394.18	282.25— 296.85
40 to 50 “ . .	364.98— 389.32	267.65— 306.58
30 to 40 “ . .	360.12— 384.45	282.25— 296.85
20 to 30 “ . .	360.12— 374.72	.....
10 to 20 “ . .	296.85	.....
5 to 10 “ . .	243.32— 272.52	.....
3 to 5 “ . .	214.12	.....

Gaboon, Congo, Niger, and other West African and scrivelloes, per hundredweight (112 pounds).

AVERAGE WEIGHT	SOUND	SLIGHTLY DEFECTIVE
70 pounds and upward	\$296.85—\$330.92	\$316.32
50 to 70 “ . .	287.12— 311.45	287.12
40 to 50 “ . .	282.25— 306.58	262.79
30 to 40 “ . .	282.25— 301.72	277.39
20 to 30 “ . .	272.52— 291.99	243.32—287.12
10 to 20 “ . .	.....	175.19
5 to 10 “ . .	170.32— 184.92	.....
3 to 5 “ . .	107.06— 111.92	.....

At the quarterly sale in Antwerp in May, 1913, ivory weighing 92 tons was disposed of, as against 87 tons at the same time in 1912. Of this total 53½ tons was Central African; 26 tons Angola; 4½ tons Congo; 2½ tons Swift-Congo; 4 tons Abyssinian; 1 ton Senegal; ½ ton Hard Egyptian, and ½ ton Soft Egyptian. Good prices were realized as there was considerable competition, the demand from America and the Continent being quite active, the London and Sheffield trades, however, only bought moderately. The increase in price amounted to £2 per cwt. for large and medium hard teeth; scrivellos (tusks under 20 pounds) registered an advance of £2 or £3 per cwt.*

The total imports of ivory into the United States according to official figures are here given for the years 1884 to 1911 inclusive, as well as the value of these imports and the average value per pound. From 1884 to 1894 this covers "animal ivory, not sawed, cut, or otherwise manufactured." This limitation was changed in 1895 to "animal ivory, sawed or cut into logs, but not otherwise manufactured," and still further modified in 1898 to "ivory in its natural state: tusks cut vertically across the grain only, with the bark left intact."† The advances noted above amount to from about 8 cents to 13 cents above the prices previously obtained. Of course, the New York prices have been mainly based upon those of the London and Antwerp markets, no duty having been imposed on unmanufactured ivory until October 4, 1913. Immediately after that date imports decreased notably, but would have risen again to the normal level if the great war had not ensued nine months later.

*The *Watchmaker, Jeweler, Silversmith and Optician*, June 1, 1912.

†Bureau of Statistics (Dept. of Commerce and Labour; before 1903, Treasury Dept.) Annual Reports on the foreign commerce of the United States.

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YEAR	WEIGHT IN POUNDS	VALUE	AVERAGE VALUE PER POUND
1884	220,880	\$ 727,733.00	\$3.30
1885	156,622	498,816.00	3.19
1886	135,920	515,464.00	3.79
1887	177,055	486,368.00	2.75
1888	210,224	685,763.00	3.26
1889	170,414	591,471.00	3.47
1890	225,858	848,105.00	3.76
1891	243,035	886,282.00	3.65
1892	270,422	893,139.00	3.30
1893	299,469	1,083,539.00	3.62
1894	123,843	374,685.00	3.03
1895	259,360	769,716.00	2.99
1896	179,119	538,947.00	3.01
1897	173,479½	452,461.00	2.61
1898	250,784	523,156.00	2.09
1899	322,518	691,724.00	2.28
1900	353,423	805,486.00	2.28
1901	424,295	842,233.00	1.99
1902	458,100	986,347.10	2.15
1903	537,556	1,200,502.00	2.23
1904	495,180	1,075,592.00	2.17
1905	627,819	1,642,958.00	2.62
1906	597,490	1,479,109.00	2.48
1907	646,990	2,005,474.00	3.10
1908	371,306	1,148,632.00	3.09
1909	766,725½	2,077,500.00	2.71
1910	592,446	1,597,287.00	2.70
1911	534,300	1,343,555.00	2.51
Totals	9,824,633½	26,772.044.10	\$2.72

As will be seen, the highest average value was in 1886 and the lowest in 1901, while that of the years 1909 and 1910 almost exactly agrees with the average for twenty-eight years.

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The figures for the two fiscal years ending, respectively, June 30, 1913, and June 30, 1914, may be compared with those just given for the calendar years up to 1912:

FOR FISCAL YEARS ENDING JUNE 30

	WEIGHT IN POUNDS	VALUE	AVERAGE VALUE PER POUND
1913 . . .	706,705	\$1,796,878	\$2.54
1914 . . .	480,516	1,315,325	2.48

FOR CALENDAR YEAR 1914

WEIGHT IN POUNDS	VALUE	AVERAGE VALUE PER POUND
320,184	\$876,086	\$2.74

It will be noted that while the weight of ivory imported last year was much less than in either of the preceding fiscal years, the average value per pound was considerably greater and, indeed, exceeds that of any calendar year since 1896, excepting the years 1907 and 1908. Undoubtedly the imposition of an *ad valorem* duty of 20 per cent. after October 4, 1913, explains in part the diminished imports, but recently the great war has been the most active cause. There can be little doubt that with the resumption of free commercial intercourse between Europe and the United States, and with the cessation of the numerous and unavoidable interruptions to trade that the war has caused, the ivory market will rapidly improve in every way.

The weight and value of the ivory imported into the United States from all parts of the world during the years 1902 to 1911, arranged according to the sources of supply, were as follows:

FROM EUROPE, POUNDS

YEAR	BELGIUM	GERMANY	UNITED KINGDOM	OTHER COUNTRIES	TOTAL FROM EUROPE
1902	125,926	48,276	104,887	759	279,848
1903	219,745	39,930	121,581	756	382,012
1904	252,896	31,343	77,194	234	361,667
1905	321,578	31,671	136,211	123	489,583
1906	232,411	13,664	219,606	1,380	467,061
1907	239,350	31,233	222,497	143	493,123
1908	120,267	14,978	131,366	126	266,737
1909	227,468	36,950	314,320	6,470	585,208
1910	208,548	15,574	203,090	176	427,388
1911	207,162	16,507	181,266	80	405,015
Totals	2,155,251	280,126	1,712,018	10,247	4,157,642

FROM ELSEWHERE, POUNDS

YEAR	NORTH AMERICA	ASIA	AFRICA	GRAND TOTAL
1902	12,921	27,306	138,025	458,100
1903	202	65,822	89,520	537,556
1904	221	45,643	87,649	495,180
1905	...	38,503	99,733	627,819
1906	775	40,443	89,211	597,490
1907	2,377	40,088	111,402	646,990
1908	113	37,216	67,240	371,306
1909	195	39,432	141,891	766,726
1910	530	50,114	114,414	592,446
1911	550	31,548	97,187	534,300
Totals	17,884	416,016	1,036,272	5,627,913

VALUE OF IMPORTS

YEAR	BELGIUM	GERMANY	UNITED KINGDOM	OTHER EURO- PEAN COUN- TRIES
1902	\$ 224,122	\$120,280	\$ 242,915	\$1,361
1903	414,407	112,181	279,843	1,321
1904	457,761	97,003	181,314	808
1905	825,396	104,327	361,481	512
1906	563,573	65,891	559,538	4,079
1907	784,048	90,175	681,005	920
1908	365,736	55,378	426,403	750
1909	597,967	111,277	876,869	13,919
1910	517,875	40,073	595,801	993
1911	505,433	40,380	475,383	352
Totals	\$5,256,318	\$836,965	\$4,679,552	\$25,015

YEAR	NORTH AMERICA	ASIA	AFRICA	TOTAL VALUE
1902	5,600	68,405	323,664	986,347
1903	95	174,248	222,533	1,204,628
1904	178	109,659	228,869	1,075,592
1905	....	91,342	260,900	1,642,958
1906	160	43,796	241,900	1,478,937
1907	1,199	103,987	344,140	2,005,474
1908	23	77,971	222,359	1,148,620
1909	110	82,739	394,619	2,077,500
1910	135	125,783	316,608	1,597,268
1911	1,100	57,364	263,543	1,343,555
Totals	\$8,600	\$935,294	\$2,819,135	\$14,560,879

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The following figures give the value of imported manufactures of ivory, both animal and vegetable, "except as elsewhere specified." This necessarily excludes many objects in which ivory has been used for decoration, but where it does not constitute a component of greatest value:

YEAR	VALUE
1891	\$61,246.70
1892	69,214.52
1893	66,804.66
1894	45,177.00
1895	31,897.97
1896	44,559.28
1897	35,187.02
1898	34,120.94
1899	48,699.13
1900	53,005.51
1901	54,995.73
1902	72,804.09
1903	80,508.83
1904	76,277.13
1905	72,316.40
1906	81,905.74
1907	68,611.74
1908	63,095.20
1909	54,806.29
1910	49,456.22
1911	51,670.45
Total	<hr/> \$1,216,360.55

The corresponding figures for the fiscal year ending June 30, 1913, were \$34,943.27, and for the year ending June 30, 1914, \$51,697.69. To this should be added, for dice, dominoes, draughts, chessmen, and for billiard, pool, and bagatelle balls of ivory, bone, or other materials, \$61,108 in 1913, and \$67,789 in 1914.

The duties on unmanufactured ivory have varied less in

the past fifty years than have those imposed upon some other materials, destined to be worked up into articles of luxury. From 1867 to 1871 the duty was 10 per cent. *ad valorem*, this impost being removed in the latter part of 1871. Until October 13, 1913, ivory (unmanufactured) remained free of duty, the impost since then, under the so-called Underwood Tariff, being 20 per cent. *ad valorem*. Manufactured articles, whether of ivory or bone, such as chessmen, dice, draughtsmen, etc., were dutiable from 1867 to 1913 at a rate of 50 per cent. *ad valorem*, other manufactured articles of vegetable ivory, bearing a duty of 35 per cent. from 1867 to 1883, 30 per cent. from 1884 to 1891, 40 per cent. from 1891 to 1895, and 35 per cent. *ad valorem* from August 28, 1895, to the present time. On unmanufactured vegetable ivory no duty has been imposed.*

In an earlier chapter the principal ivory substitutes have been described and some details given of their use.† For the cheaper toilet articles, and for a number of other objects, celluloid has been quite extensively employed, although it is not a very satisfactory substitute. The value of the manufactured, or partly manufactured, material imported has varied widely in the different years, owing to the character and quality of the workmanship, the cost of manufacture being of course the main element of value. Thus when a large quantity of fully manufactured articles are imported, the total value will be many times what it would have been if a great share of the material had been brought in only partly finished, or only prepared for working. The use of celluloid for the small front facing of piano keys has been alluded to in the chapter on the working of ivory.

*These details have been courteously furnished by Mr. E. A. Blared, of the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C.

†Chapter VIII, pp. 279-291.

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The imports of finished, or partly finished, articles of manufactured collodion (celluloid) into the United States are here given (artificial silk being expressly excepted after 1901) for the years 1885 to 1911, inclusive:

YEAR	WEIGHT IN POUNDS	VALUE IN DOLLARS
1885	27.00	\$ 122.00
1886	96.00	1,111.00
1887	121.00	1,110.00
1888	124.00	921.00
1889	637.00	1,580.00
1890	2,115.00	5,366.00
1891	4,459.00	9,446.31
1892	11,912.00	33,165.00
1893	14,909.00	48,515.05
1894	26,531.00	90,491.27
1895	11,563.56*	370,045.42
1896	.....	330,104.47
1897	.....	254,256.14
1898	59,348.00	135,697.62
1899	109,425.15	235,482.43
1900	180,895.44	369,120.36
1901	104,913.46	268,644.68
1902	56,760.30	155,002.73
1903	77,554.68	175,104.91
1904	121,848.93	235,508.24
1905	59,346.55	162,779.57
1906	86,461.29	270,553.68
1907	116,073.24	870,407.24
1908	185,205.97	1,868,301.48
1909	125,782.43	1,136,897.18
1910	77,917.94	328,469.37
1911	55,041.34	129,112.74
Totals	1,489,069.28†	\$7,603,315.89

*This weight represents only \$38,152 of the total value for the year 1895; for part of 1895, and for 1896 and 1897, there was only an *ad valorem* duty.

†The actual total weight might be placed at about 1,800,000 pounds.

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Total imports of animal ivory into Great Britain from 1896 to 1910 inclusive:

YEAR	WEIGHT IN POUNDS	VALUE IN DOLLARS	AVERAGE VALUE PER POUND
1896	1,091,100	\$ 2,226,804	\$2.04
1897	1,028,800	2,048,863	1.99
1898	1,000,200	1,990,838	1.99
1899	993,900	1,959,499	1.96
1900	988,900	1,933,334	1.95
1901	882,500	1,628,160	1.84
1902	1,082,100	1,931,332	1.78
1903	924,100	1,648,438	1.78
1904	904,500	1,754,293	1.94
1905	1,055,000	2,058,469	1.95
1906	985,500	1,978,042	2.01
1907	1,078,700	2,718,693	2.52
1908	934,500	2,094,700	2.24
1909	1,155,500	2,590,215	2.24
1910	1,120,000	2,397,833	2.14
Totals	15,225,300	\$30,959,513	\$2.03

Weight in pounds and source of animal ivory imported into Great Britain:

	1906	1907	1908	1909	1910
Germany	73,300	93,100	125,500	149,300	88,200
German West Africa .	62,000	45,400	34,400	17,900	12,800
Netherlands . . . . .	.....	800	300	4,600	4,000
Belgium	222,900	262,000	195,400	315,300	314,200
France	63,200	50,400	41,100	36,900	23,000
French West Africa	47,000	41,100	36,900	23,000	29,700
Portuguese West Africa	3,500	1,000	800	900	400
Portuguese East Africa	12,700	9,200	14,600	25,300	27,100
Egypt	144,700	187,900	144,800	177,600	199,400
Tripoli	8,700	20,300	17,300	12,300	28,300
Congo Free State .	12,300	15,000	36,000	9,900	30,100
United States of America	152,800	79,000	68,500	101,400	99,800
Other foreign countries	12,700	13,100	27,500	28,400	16,500
Total from foreign countries . .	815,800	818,300	743,200	921,800	888,800

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	1906	1907	1908	1909	1910
Forward . . .	815,800	818,300	743,200	921,800	888,800
Malto and Gozo . . .	19,700	16,900	9,000	11,600	16,900
British West Africa:					
Gambia	5,100	1,400	2,500	3,500	1,100
Sierra Leone . . .	2,700	3,600	2,700	5,600	2,000
Gold Coast . . .	2,800	1,100	1,300	2,200	1,800
The Colony and Pro- tectorate of South- ern Nigeria . . .	.....	.....	8,300	7,200	12,800
Protectorate of Northern Nigeria	8,100	11,100	.....	.....	.....
British East Africa:					
Zanzibar and Pemba	26,700	64,700	60,100	91,300	73,600
East African Protec- torate	31,200	28,100	36,200	26,500	35,600
Aden and Dependencies	37,400	59,200	29,900	37,300	38,800
British India . . .	24,900	58,100	31,600	43,100	43,800
Other British posses- sions	11,100	16,200	9,700	5,400	4,800
Total from British possessions . .	169,700	260,400	191,300	233,700	231,200
Grand total. . .	985,500	1,078,700	934,500	1,155,500	1,120,000

Value in dollars of animal ivory imported into Great Britain, according to the foreign country or colony whence it was consigned:

	1906	1907	1908	1909	1910
Germany . . .	\$157,339	\$231,389	\$236,229	\$319,276	\$159,415
German West Africa . . .	144,574	121,042	80,389	37,985	27,102
Netherlands . . .	815	2,595	888	10,355	7,760
Belgium	513,475	836,019	558,449	848,226	838,434
France	136,528	84,240	84,065	121,017	66,566
French West Africa	107,112	104,523	93,649	54,626	51,221
Portuguese West Africa . . .	7,367	2,459	2,071	1,969	1,111
Forward . .	\$1,067,210	\$1,382,267	\$1,055,740	\$1,393,454	\$1,151,609

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	1906	1907	1908	1909	1910
Forward .	\$1,067,210	\$1,382,267	\$1,055,740	\$1,393,454	\$1,151,609
Portuguese East					
Africa . . .	25,948	20,666	30,002	58,118	58,108
Egypt . . .	321,259	440,482	312,549	379,896	404,010
Tripoli . . .	19,861	50,009	35,327	26,355	53,466
Congo Free State	25,181	38,330	85,384	23,474	72,284
United States of America . . .	49,693	24,556	25,050	28,659	32,976
Other foreign countries	31,865	25,768	61,794	59,141	29,726
Total from foreign countries	\$1,541,017	\$1,982,078	\$1,605,841	\$1,969,097	\$1,802,179
Malta and Gozo	37,200	39,149	19,352	23,925	35,774
British West Africa:					
Gambia . . .	10,161	2,309	4,923	6,742	2,100
Sierra Leone .	4,181	7,566	5,209	10,468	4,103
Gold Coast .	6,140	2,677	2,435	3,953	4,545
The Colony and Protectorate of Southern Nigeria			18,673	16,320	35,712
Protectorate of Northern Nigeria	18,546	27,466			
British East Africa:					
Zanzibar and Pamba .	64,428	187,497	147,838	241,375	181,924
East African Protectorate .	93,149	89,318	86,582	65,684	78,444
Aden and Dependencies . . .	112,923	172,461	79,608	104,270	105,502
British India .	68,603	171,816	99,455	139,657	141,009
Other British possessions . . .	21,694	36,356	24,784	8,706	8,541
Total from British possessions	\$437,025	\$736,615	\$488,859	\$621,118	\$595,654
Grand total	\$1,978,042	\$2,718,693	\$2,094,700	\$2,590,215	\$2,397,833

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The following figures give the trade in animal ivory to and from Great Britain in 1913:

	WEIGHT IN CWTs.	VALUE POUNDS STERLING
Imports	10,154	489,698
Exports	7,112	414,376

Equivalent in pounds avoirdupois and dollars:

	POUNDS	DOLLARS
Imports	1,137,248	\$2,379,931
Exports	796,544	2,013,867

German ivory imports (free of duty) for 1911, 1912:

CLASSIFICATION AND SOURCE	TONS, 1911	TONS, 1912
Raw ivory, including walrus tusks:		
Total importations	310.6	315.7
From Great Britain	125.9	102.0
From British India	70.3	73.8
From Congo	38.7	73.5
From Belgium	27.8	13.2
From Cameroon	6.8	8.2
From Abyssinia	1.7	6.5
From Austria-Hungary	6.0	6.4
Ivory sheets or pieces:		
Total importations	17.9	21.3
From France	2.5	4.0
From Great Britain	8.9	10.3
Ivory in plates or pieces:		
Total importations	76.1	85.8
From France	13.7	11.4
From Great Britain	62.6	74.2

Exports and imports of manufactured ivory, etc., to and from Germany:

FROM 1885 TO 1896, INCLUSIVE*

YEAR	IMPORTS		EXPORTS	
	WEIGHT <i>Kilograms</i>	VALUE <i>Marks</i>	WEIGHT <i>Kilograms</i>	VALUE <i>Marks</i>
1885 . .	165,800	3,316,000	213,900	4,278,000
1886 . .	176,600	3,532,000	256,100	5,122,000
1887 . .	192,500	3,850,000	315,600	6,312,000
1888 . .	237,700	4,754,000	367,700	7,354,000
1889 . .	317,700	6,354,000	380,200	7,604,000
1890 . .	300,400	9,012,000	420,900	8,418,000
1891 . .	346,700	10,401,000	462,700	9,254,000
1892 . .	333,000	9,990,000	474,900	9,498,000
1893 . .	318,900	9,567,000	658,000	13,160,000
1894 . .	310,500	9,315,000	611,900	12,238,000
1895 . .	238,300	7,149,000	528,000	10,560,000
1896 . .	188,000	4,474,000	514,500	15,075,000

* Somborn, "Die Elfenbeinschnitzerei," Heidelberg, 1899, pp. 84-87. See also note as follows: "Manufactures of Ivory are only given since 1885; moreover, these figures only offer an approximation, as they include manufactures of tortoise-shell, mother-of-pearl, etc."

IMPORTS OF IVORY INTO GERMANY

1880 TO 1890 INCLUSIVE

WEIGHT IN KILOGRAMS—VALUE IN MARKS

	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890
Free Port of Hamburg..	43,100	50,900	54,400	42,300	31,000	10,400	29,000	44,600	—	—	—
Customs Board of Weeser & Elbe	3,700	—	—	—	—	—	—	—	22,700	3,900	—
Belgium	—	9,500	—	—	1,800	—	—	—	—	3,800	20,200
France.....	2,000	1,900	1,400	—	7,000	4,100	2,600	2,700	1,600	1,800	—
Great Britain	31,300	45,700	40,200	67,200	56,800	66,800	39,800	29,900	96,300	118,300	113,100
Italy	—	—	—	—	—	—	—	—	—	—	—
Holland	6,400	5,900	14,400	17,100	7,200	2,800	1,100	—	1,700	12,700	12,100
Norway	—	—	—	—	—	—	—	—	—	—	—
Austria-Hungary.....	1,500	—	—	3,100	—	—	—	—	—	—	—
Portugal	—	—	—	—	—	—	—	—	—	3,900	—
Russia.....	—	2,500	2,100	8,700	—	—	—	—	—	—	—
Switzerland.....	—	—	—	—	—	—	—	—	—	1,700	—
Turkey.....	—	—	—	—	—	—	—	—	—	—	—
Egypt	—	—	—	—	—	—	—	—	—	—	—
German West Africa.....	—	—	—	—	—	—	—	—	—	6,000	11,000
German East Africa	—	—	—	—	—	—	—	—	—	2,300	5,300
West Africa } Outside German Possessions }	28,900	3,500	6,100	—	—	—	—	1,000	1,900	7,100	2,700
East Africa }	—	—	—	—	—	—	—	—	—	4,900	13,600
British East Indies	6,600	—	—	—	—	—	—	—	—	6,500	7,800
United States	—	—	—	—	4,000	—	—	—	5,100	—	—
Other Countries.....	5,000	1,000	600	4,200	1,600	2,400	1,600	1,000	900	1,500	3,300
Total (Kilograms)	128,500	120,900	119,200	142,600	109,400	86,400	74,100	79,200	129,200	174,400	189,100
Value in Marks.....	2,313,000	2,055,000	2,026,000	2,709,000	2,079,000	1,644,000	1,408,000	1,584,000	2,584,000	4,011,000	3,971,000

IMPORTS OF IVORY INTO GERMANY

1880 TO 1896 INCLUSIVE

WEIGHT IN KILOGRAMS—VALUE IN MARKS

Source	1891		1892		1893		1894		1895		1896	
	Weight	Value	Weight	Value	Weight	Value	Weight	Value	Weight	Value	Weight	Value
Free Port of Hamburg...	—	—	—	—	—	—	300	5,000	—	—	—	—
Customs Board of Weeser & Elbe	—	—	—	—	—	—	—	—	—	—	—	—
Belgium	8,500	170,000	23,400	468,000	41,000	738,000	22,500	371,000	45,300	747,000	58,900	942,000
France	1,600	32,000	3,900	78,000	2,500	45,000	2,000	33,000	2,600	43,000	2,700	43,000
Great Britain.....	135,400	2,708,000	116,800	2,336,000	113,700	2,047,000	139,300	2,298,000	119,900	1,978,000	100,400	1,607,000
Italy.....	100	2,000	—	—	—	—	—	—	—	—	—	—
Holland.....	800	16,000	1,900	38,000	500	9,000	900	15,000	300	5,000	200	3,000
Norway	—	—	—	—	—	—	—	—	100	2,000	—	—
Austria-Hungary	100	2,000	1,000	20,000	300	5,000	100	2,000	—	—	—	—
Portugal	2,100	42,000	—	—	—	—	—	—	—	—	—	—
Russia	100	2,000	—	—	—	—	100	2,000	400	7,000	—	—
Switzerland	—	—	—	—	—	—	—	—	—	—	—	—
Turkey	400	8,000	800	16,000	—	—	100	2,000	300	5,000	—	—
Egypt	—	—	—	—	—	—	—	—	1,200	20,000	—	—
German West Africa....	10,400	208,000	3,600	72,000	3,200	57,000	3,500	58,000	4,900	81,000	3,800	61,000
German East Africa	400	8,000	1,100	22,000	200	3,000	500	8,000	500	8,000	400	6,000
West Africa } Outside German Possessions	8,200	164,000	16,800	336,000	16,200	292,000	22,500	371,000	21,900	361,000	32,400	518,000
East Africa }	15,100	302,000	20,300	406,000	14,200	256,000	19,600	323,000	12,300	203,000	10,700	171,000
British East Indies	3,000	60,000	8,900	178,000	1,400	25,000	2,600	43,000	300	5,000	2,100	34,000
United States	—	—	7,200	144,000	5,200	94,000	4,100	68,000	100	2,000	100	2,000
Other Countries	200	4,000	200	4,000	100	2,000	—	—	200	3,000	—	—
Totals	186,400	3,728,000	205,900	4,118,000	198,500	3,573,000	218,100	3,599,000	210,300	3,470,000	211,700	3,387,000

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The following are official figures of German exports and imports of ivory for the years 1911, 1912, and 1913.*

IMPORTS						
SOURCE	1911		1912		1913	
	WEIGHT <i>Tons</i>	VALUE <i>Marks</i>	WEIGHT <i>Tons</i>	VALUE <i>Marks</i>	WEIGHT <i>Tons</i>	VALUE <i>Marks</i>
Belgium . . .	28	667,000	....	.....	.....	.....
Belgian Congo .	39	929,000	74	1,838,000	48	1,341,000
Great Britain .	126	3,021,000	102	2,550,000	83	2,021,000
British India .	70	1,687,000	74	1,845,000	67	1,870,000
Other sources .	48	1,183,000	65	1,630,000	101	3,431,000
Totals . . .	311	7,457,000	315	7,863,000	309	8,663,000

EXPORTS					
1911		1912		1913	
WEIGHT <i>Tons</i>	VALUE <i>Marks</i>	WEIGHT <i>Tons</i>	VALUE <i>Marks</i>	WEIGHT <i>Tons</i>	VALUE <i>Marks</i>
108	1,849,000	157	2,230,000	126	2,446,000

The ivory trade of German East Africa is carried on both through the seaports and across the land frontier, the respective exports being as follows from 1909 to 1913 inclusive:

	CUSTOM-HOUSES OF COAST FRONTIER		CUSTOM-HOUSES OF INLAND FRONTIER		TOTALS	
	WEIGHT <i>Kilograms</i>	VALUE <i>Marks</i>	WEIGHT <i>Kilograms</i>	VALUE <i>Marks</i>	WEIGHT <i>Kilograms</i>	VALUE <i>Marks</i>
1909	37,910	960,085	3,224	66,309	41,134	1,026,394
1910	34,124	703,408	2,121	39,686	36,245	743,094
1911	23,566	444,611	2,227	40,799	25,793	485,410
1912	14,575	305,739	2,384	55,576	16,959	361,315
1913	8,918	186,337	1,909	44,183	10,827	230,520
Totals	119,093	2,600,180	11,865	246,553	130,958	2,846,733

The rapid and progressive falling off in these exports is very noteworthy. Owing to the interruption of intercourse with Germany resulting from England's control of the seas,

*From the "Deutsches Kolonialblatt," 1910-1914.

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later figures are not available and of course this trade, as far as Germany is concerned, has come to a standstill.

Exports of ivory from the Congo from 1888 to 1909, with the sources whence it was derived:*

FROM THE CONGO STATE AND FRENCH CONGO

YEAR	CONGO STATE		FRENCH CONGO	
	WEIGHT <i>Kilograms</i>	VALUE <i>Francs</i>	WEIGHT <i>Kilograms</i>	VALUE <i>Francs</i>
1888.	54,812	1,096,240	18,658	373,160
1889	113,532	2,270,640	3,601	72,020
1890	180,605	4,668,887	6,305	160,358
1891	141,775	2,835,500	16,661	333,220
1892	186,521	3,730,420	4,815	96,300
1893	185,933	3,718,660	3,142	62,840
1894	252,083	5,041,660	7,238	144,760
1895	292,232	5,844,640	24,381	487,620
1896	191,316	3,826,320	50,738	1,014,760
1897	245,824	4,816,480	53,908	1,078,160
1898	215,963	4,319,260	84,402	1,688,040
1899	291,731	5,834,620	78,800	1,576,000
1900	262,665	5,253,300	118,434	2,368,680
1901	.....	.....	.....	.....
1902	249,307	4,986,140	133,491	2,669,820
1903	.....	.....	.....	.....
1904	166,948	3,839,804	132,406	3,045,338
1905	211,338	4,837,774	152,986	3,518,678
1906	178,207	4,455,175	131,424	3,285,600
1907	203,583	6,414,900	143,355	4,517,116
1908	228,757	5,936,244	138,345	3,590,052
1909	243,823	6,583,221	135,237	3,651,399

Perhaps, in the interest of the ivory trade, the partial check upon ivory exports in some parts of Africa and their total cessation in others, is no unmixed evil, for this state of things operates automatically to check the destruction of the elephants even more effectively than do the special laws and regulations enacted for this purpose in the elephant regions of Africa.

*From Bulletins officiels de l'État Indépendant du Congo, Bruxelles, 1888-1908.

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FROM PORTUGUESE CONGO AND GERMAN CONGO

YEAR	PORTUGUESE CONGO		GERMAN CONGO	
	WEIGHT <i>Kilograms</i>	VALUE <i>Francs</i>	WEIGHT <i>Kilograms</i>	VALUE <i>Francs</i>
1888	. .	28,276	565,520	.....
1889	. .	9,284	185,680	.....
1890	. .	9,412	241,606	.....
1891	. .	7,469	149,380	.....
1892	. .	3,205	64,100	.....
1893	. .	1,287	25,740	.....
1894	. .	1,192	23,840	.....
1895	. .	101	2,020	.....
1896	. .	464	9,280	.....
1897	. .	477	9,540	.....
1898	. .	254	5,080	54 1,080
1899	. .	103	2,060	7,139 142,780
1900	. .	117	2,340	15,951 319,020
1901
1902	. .	160	3,200	12,516 250,320
1903
1904	. .	21	483	13,155 302,565
1905	. .	40	920	5,215 120,773
1906	. .	74	1,850	4,314 107,850
1907	. .	369	11,627	2,853 89,898
1908	. .	411	10,665	2,334 60,567
1909	. .	405	10,935	4,031 108,837

EXPORT OF IVORY FROM THE BELGIAN CONGO ALONE,
FOR THE YEARS 1910-1913

IN KILOGRAMS							
1910	236,822	1912	233,675		
1911	226,433	1913	274,495		

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Imports of Congo ivory into Great Britain from 1870 to 1895, in tons:*

TONS					TONS				
1870	.	.	.	.	667½	1883	.	.	586½
1871	.	.	.	.	664½	1884	.	.	468
1872	.	.	.	.	586½	1885	.	.	442
1873	.	.	.	.	632½	1886	.	.	400
1874	.	.	.	.	610½	1887	.	.	419
1875	.	.	.	.	680½	1888	.	.	508
1876	.	.	.	.	568½	1889	.	.	400
1877	.	.	.	.	626½	1890	.	.	444
1878	.	.	.	.	627½	1891	.	.	436
1879	.	.	.	.	444½	1892	.	.	430
1880	.	.	.	.	456½	1893	.	.	339½
1881	.	.	.	.	540	1894	.	.	395½
1882	.	.	.	.	425½	1895	.	.	376½

Imports and sales of ivory in Antwerp from 1888 to 1913 (kilograms) and average price realized per kilogram:†

		IMPORTATIONS	SALES	AVERAGE PRICE <i>Francs</i>
1888	.	6,400	6,400	24.00
1889	.	46,600	46,600	28.24
1890	.	77,500	77,500	25.51
1891	.	59,500	59,500	20.02
1892	.	118,000	118,000	18.43
1893	.	224,000	224,000	16.00
1894	.	264,500	186,000	15.05
1895	.	362,000	274,000	16.40
1896	.	200,000	265,700	15.82
1897	.	265,000	281,000	16.95
1898	.	231,000	205,300	18.35
1899	.	328,000	292,500	28.24
1900	.	333,000	336,000	17.93
1901	.	327,200	312,000	19.41

*"La Belgique Coloniale," 2d Année, p. 9, 1896.

†Royaume de Belgique. Ministère des Colonies, Renseignements de l'Office Colonial, No. 1, January 1914, pp. 44-47.

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		IMPORTATIONS	SALES	AVERAGE PRICE <i>Francs</i>
1902	. .	370,000	322,000	20.16
1903	. .	354,000	356,000	19.15
1904	. .	293,000	329,000	21.54
1905	. .	338,000	339,500	28.55
1906	. .	287,000	303,800	27.90
1907	. .	327,800	312,400	33.52
1908	. .	347,000	227,700	26.40
1909	. .	369,000	337,000	25.14
1910	. .	330,000	336,500	24.00
1911	. .	347,000	342,413	24.40
1912	. .	341,400	385,330	24.26
1913	. .	351,000	454,776	28.10

There has been a general decrease in the average weight of the tusks imported to Antwerp. In 1889 this average was $12\frac{1}{2}$ kilograms and in 1890 $10\frac{2}{10}$ kilograms; but in 1896 the average had fallen to $6\frac{2}{3}$ kilograms, recovering somewhat from this low point to 9 kilograms in 1900 and $8\frac{3}{8}$ kilograms in 1901.*

Although this necessitates a repetition of the figures for the Antwerp sales, we give here the sales from 1886 at the three European ivory marts, Antwerp, London, and Liverpool, so as to exhibit in a graphic way the passage of the primacy in this trade from London to Antwerp. What the further development may be when the port of Antwerp is again opened to the world's commerce it would not be easy to predict with any certainty, but trade routes are not often completely and radically changed in accord with temporary political vicissitudes. This is the lesson taught us by history, both ancient and modern, many of the Asiatic and African trade routes having been used for commercial intercourse from the very dawn of history; indeed, the use of some of them must considerably antedate our oldest historic records.

*H. Jacob de Cordemoy, "Les produits coloniaux d'origine animale," Paris, 1903, p. 201.

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Total weight in kilograms of ivory sold at Antwerp, London, and Liverpool from 1886 to 1913.

	ANTWERP	LONDON	LIVERPOOL
1886 . . .		340,000	75,000
1887 . . .		330,000	99,000
1888 . . .	6,400	373,000	105,000
1889 . . .	46,600	301,000	71,000
1890 . . .	77,500	357,000	73,000
1891 . . .	59,500	421,000	65,000
1892 . . .	118,000	396,900	60,000
1893 . . .	224,000	359,000	69,000
1894 . . .	186,000	376,000	60,000
1895 . . .	274,000	344,000	47,000
1896 . . .	265,700	284,000	56,000
1897 . . .	281,000	278,000	50,000
1898 . . .	205,300	300,000	55,000
1899 . . .	292,500	267,000	38,000
1900 . . .	336,000	320,000	32,000
1901 . . .	312,000	288,000	41,000
1902 . . .	322,000	269,000	39,000
1903 . . .	356,000	224,000	41,000
1904 . . .	329,000	212,000	40,000
1905 . . .	339,500	245,500	33,500
1906 . . .	303,800	208,500	37,250
1907 . . .	312,400	241,000	22,000
1908 . . .	227,700	214,000	28,500
1909 . . .	377,000	310,000	24,000
1910 . . .	336,500	257,500	19,250
1911 . . .	342,413	276,000	13,750
1912 . . .	385,330	245,000	15,250
1913 . . .	454,776	236,250	12,250

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The sources and grades of the ivory imported at Antwerp during 1899, 1900, and 1901, were as follows:*

SOURCES AND GRADES	1899 <i>Kilograms</i>	1900 <i>Kilograms</i>	1901 <i>Kilograms</i>
Congo (Hard . . .	207,355	237,607	222,745
(Soft . . .	12,571	12,427	15,395
Angola (Ambriz .	.....	3,703	6,850½
(Soft Benguela	235	.....	593
Senegal	1,736	1,269	4,107
Gabon	12,322	11,982	18,721½
Abyssinia . . .	886	9,727	2,244
Mozambique . .	.....	1,046	3,040
Cameroons . . .	2,968	10,681	16,459
Zanzibar	964	852	75
Siam . . . . .	.....	149	32
Egypt . . . . .	.....	.....	1,153

The prices realized for the various qualities and denominations of ivory in the Antwerp market in 1910, 1911, 1912, and 1913, were as follows, the figures signifying francs:

	END OF 1910 FRANCS	END OF 1911 FRANCS	END OF 1912 FRANCS	END OF 1913 FRANCS
Sound tusks	26½-39½	26 -40½	27½-46½	26½-39½
Tusks more or less defective	25½-34½	27 -38½	27 -34½	28½-42½
Defective tusks	24½-29½	25 -34½	26 -37½	27½-38½
Very defective tusks	10 -29½	10 -29	8½-29	10½-33½
Oversizes	27 -30½	28 -32½	29 -31	32½-35
" flat	27 -29½	28 -32½	26½-29½	30½-35
Bangles	27½-31½	28 -33½	28½-33½	29½-36½
" light	21½-26½	22 -27	25 -28	23½-28½
" flat	25½-29½	26½-32½	26½-29½	27½-34½
" flat and light	18½-23½	20½-25½	21½-25½	23½-28½
Billiard ball pieces 2½ to 3 in.	36½-40½	35 -39½	35½-43½	38½-47½
Billiard ball pieces 2½ to 3 in.	25½-32	22 -26½	27 -28½	30½-35

*H. Jacob de Cordemoy, "Les produits coloniaux d'origine animale," Paris, 1903, p. 901.

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	END OF 1910 FRANCS	END OF 1911 FRANCS	END OF 1912 FRANCS	END OF 1913 FRANCS
Billiard ball pieces 2½				
to 3 in.	24½-26	22½-24½	22-25	27½-30
Billiard ball pieces 2				
to 3 in.	20½-21½	18½-20	18½-21	23-26½
Scrivelloes, solid	12-19½	14-17	12-16	15½-18½
“ hollow, heavy	14½-17½	12½-15½	13-17½	16-19½
“ light	7½-12½	10-12½	11½-14	12-15½

The value per hundredweight (112 lbs.) of sound, fresh mammoth ivory in the London market is stated to have ranged, not long ago, all the way from 20 shillings to £15 or even £30 for exceptionally fine tusks. For the past year, of course, there have been no shipments of this ivory received in England. Even the highest of the prices noted is very considerably lower than those commanded by ivory from the living African elephants.

Since 1906 ivory has been exported from the Anglo-Egyptian Sudan in annually increasing quantities, the increase in the six years from 1906 to 1912 being very marked; in the first-named year only 20,354 kilos were exported, but in 1912 the weight of the exported ivory was 106,755 kilos. This would indicate the killing of 4,000 elephants in the latter year (although of course part of the ivory may have come from animals that died a natural death), if we figure on the ascertained average of about 13½ kilos for each tusk. The provinces Bahr-el-Ghazal and Mongalla furnish the greater part of the supply, the balance coming from the region of the Sobat and its tributaries and the Bahr-el-Arab country. The centres for ivory trade are Khartoum and Omdurman, and most of the product finds its way to the London market. The following table shows the destination of the Sudan ivory for 1912

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and the quantities exported to each of the various countries:*

	WEIGHT <i>Kilograms</i>	VALUE <i>Pounds Egyptian</i>
Austria	265	261
Belgium	625	513
Egypt	357	193
Eritrea	374	217
France	63	68
Great Britain	87,200	75,670
Germany	182	178
United States	16,249	16,260
Other countries	1,440	1,105
Totals	106,755	94,465

The value of the ivory exported from various parts of West Africa in 1912 is given as follows:

French Guinea	\$ 30,423
Togoland	8,555
Cameroons	127,614
Gambia	827

Only a very small quantity is exported at present from Sierra Leone.†

The import and export movement in the Indian ivory trade, as given for 1904–5, shows that while the value of the ivory imported was 7,439,671 rupees (\$2,478,890), the exports of ivory and of manufactures thereof totalled but 585,934 rupees (\$195,311); the manufactured product probably represented a considerable percentage of the whole value.‡

While in the first two ivory sales in the London market in 1914 prices were practically unchanged, the financial distrust due to expectation of war made itself felt at the July sales, causing a general decline, except in the case of

*Communicated by Capt. Gilbert Clayton, Sudan Agent, War Office, Cairo, Egypt.
†Communicated by U. S. Consul N. J. Yerby, of Sierra Leone, Africa.
‡The Imperial Gazetteer of India, Vol. III, Oxford, 1907, pp. 308, 310.

“ball ivory,” which brought as much or even a little more than at the earlier sales. The regular October sales were indefinitely postponed, but many private transactions have taken place. In these, hard ivory has maintained its price, but the less valuable qualities, such for instance as the grades known in the trade as “soft scrivellos” and “cut hollows,” have found little demand. It is noteworthy, however, that in general the dealings in ivory have been less seriously interfered with than those in most other articles of luxury. The supplies of Egyptian and West Coast African ivory have been larger in 1914 than in 1913. But few walrus tusks have been received, the demand being slack and the prices lower; a limited quantity of boars’ tusks was disposed of at unchanged prices. The stock of ivory on hand in London at the close of 1914 was 188 tons, against 105 tons at the end of 1913, this notable increase being due to the transfer from Antwerp of a large quantity of Congo ivory.*

IMPORTS OF IVORY INTO GREAT BRITAIN, 1912, 1913

	1912 CWTs.	1913 CWTs.	1912 VALUE	1913 VALUE
IVORY, ANIMAL				
Germany	756	487	£ 27,131	£ 15,883
German West Africa	139	87	1,769	4,183
Netherlands	13	3	659	152
Belgium	3,428	3,314	200,022	196,128
France	203	279	8,978	11,972
French West Africa	158	138	7,322	6,407
Portuguese East Africa	213	159	9,111	6,969
Egypt	2,452	2,456	120,301	124,481
Tripoli . . . . .	.....	3	.....	125
Congo Free State . . .	103	263	5,265	13,349
U. S. of America . . .	978	1,032	5,361	5,964
Other foreign countries	311	200	12,184	8,938
<hr/>				
Total from foreign countries	8,754	8,421	£398,103	£394,501

*Messrs. Hale & Sons’ Annual Ivory Report for 1914.

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	1912 CWTs.	1913 CWTs.	1912 VALUE	1913 VALUE
Malta and Gozo . . .	8	1	£ 337	£ 60
British West Africa:				
Gambia	14	10	347	297
Sierra Leone . . .	46	29	1,283	1,350
Gold Coast	20	25	855	1,126
The Colony and Pro- tectorate of South- ern Nigeria . . .	139	190	6,473	10,659
British East Africa:				
Zanzibar and Pemba	617	523	31,312	27,767
East Africa Protecto- rate	289	307	14,647	15,883
Aden and Dependen- cies	366	239	17,449	17,733
British India	582	237	27,099	11,980
Other British posses- sions	114	172	6,134	8,342
Total from British possessions . . .	2,195	1,733	£105,936	£ 95,197
IVORY, VEGETABLE				
Germany	7,144	5,829	£ 8,618	£ 8,315
Colombia	1,368	4,441	1,589	6,348
Ecuador	7,079	36,915	7,868	51,969
Other foreign coun- tries	18,514	24,277	18,500	23,624
Total from foreign countries . . .	34,105	71,462	£ 36,575	£ 90,256
Total from British possessions . . .	3,216	2,350	3,088	2,251
Totals Cwts.	37,321	73,812	£ 39,663	£ 92,507

FOR THE YEAR 1914

IVORY, ANIMAL

9,739 cwts, value £456,493.

For the four months ended April 30, 1915.

2,866 cwts., value £137,743.

EXPORTS OF IVORY

	1912 cwts.	1913 cwts.	1912 VALUE	1913 VALUE
IVORY, ANIMAL				
Germany	2,447	1,956	£134,803	£120,100
France	1,470	1,449	81,601	96,581
U. S. of America .	1,576	1,958	89,961	110,007
Other foreign countries	296	218	14,440	10,227
	<hr/>	<hr/>	<hr/>	<hr/>
Total to foreign countries	5,789	5,581	£320,805	£336,915
British India	1,576	1,473	£ 77,742	£ 74,678
Other British possessions	65	58	3,907	2,783
	<hr/>	<hr/>	<hr/>	<hr/>
Total to British possessions . . . Cwts. 1,641		1,531	£ 81,649	£ 77,461
 IVORY, VEGETABLE				
Germany	12,057	41,414	£ 12,516	£ 54,367
Italy	4,278	2,653	5,036	3,341
Other foreign countries	4,445	3,348	4,656	3,147
	<hr/>	<hr/>	<hr/>	<hr/>
Total to foreign countries	20,780	47,415	£ 22,208	£ 60,855
Total to British possessions	328	.....	148	.....
	<hr/>	<hr/>	<hr/>	<hr/>
Total	21,108	47,415	£ 22,356	£ 60,855

FOR THE YEAR 1914

IVORY, ANIMAL

4,772 cwts., value £292,754.

For the four months ended April 30, 1915.
1,301 cwts., value £68,079.

ADDENDA

A MODERN TALISMAN

A CURIOUS modern talisman is a splendid specimen of artistic jewellery exhibited at the Paris Salon; this talisman cleverly combines artistic merit with a dash of African magic. It is a slender bracelet composed of interlaced spirals of oxidized silver and gold; around the circlet is twined a hair taken from an elephant. Among the tribesmen of the Sudan the hairs of this animal are believed to be endowed with great talismanic virtue; indeed, they enjoyed a similar repute among the ancient Romans. Whether this belief was due to the idea that the wearer of the hair was assured a mighty protection, typified by the enormous strength of the elephant, or whether to the fact that the elephant was with some peoples a divine symbol, we cannot easily determine.*

FOSSIL TUSKS

The writer, on closely examining some of the fossil tusks from the Lena River, Siberia, found what was evidently a mineral resulting from a decomposition of the mammoth tusks in the form of deposits of a whitish crystalline substance. When tested by Prof. William E. Ford, of the Sheffield Scientific School, Yale University, this was pronounced to be struvite, a hydrous phosphate of ammonium and mag-

*George Frederick Kunz, "The Magic of Jewels and Charms," Philadelphia and London, 1915, p. 375.

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Year	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

1961

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201	202	203	204	205
206	207	208	209	210
211	212	213	214	215

nesium. The material was easily fusible, with faint green flame, and is readily soluble in acids. It gives the characteristic reaction for phosphoric acid, and also gives a test for magnesium. In the closed tube it secretes abundant water and emits a distinct odour of ammonia.

THE CHARACTERISTICS OF IVORY ARE AFFECTED BY THE
HABITAT OF THE ELEPHANT

The ivory from elephants of the Northeastern Uele in the Congo, which roam over a region of dry brush, or of thinly wooded valleys, where plenty of food is to be had, is more massive and less hollow than that from the elephants of the forests. Here, where the food is more succulent, the ivory is, as a rule, more hollow and less dense, and the nerve only traverses about a third of the length of the tusk. Elephants having tusks, each of which weighs from 50 to 100 lbs., are fairly common near Faradje, Dungi, Gombari, Vankerckhovenille, and Aba in the Congo.*

MASTODON OR MAMMOTH REMAINS

An early notice of the finding of mastodon or mammoth remains in the western and southern parts of the United States appears in the writings of Thomas Jefferson. The following extract shows that the Indians of this time, about 1782, rivalled the Alaskan Indians of our day in their ability to invent a description of living mammoths. Jefferson writes:†

“It is well known that on the Ohio, and in many parts of America farther North, tusks, grinders, and skeletons of unparalleled magnitude are found in great numbers, some lying on the surface of the earth, and some a little below it.

*Communicated by Mr. Herbert Lang, of the American Museum of Natural History Expedition to the Congo.

†“Notes on the State of Virginia,” by Thomas Jefferson, Philadelphia, 1788, p. 41.

A Mr. Stanley, taken prisoner by the Indians near the mouth of the Tanissee, relates that after being transferred through several tribes, from one to another, he was at length carried over the mountains west of the Missouri to a river which runs westwardly; that these bones abounded there; and that the natives described to him the animal to which they belonged as still existing in the northern parts of their country; from which description he judged it to be an elephant. Bones of the same kind have been found, some feet below the surface of the earth, in salines on the North Holston, a branch of the Tanissee, about the latitude of $36\frac{1}{2}^{\circ}$ North. From the accounts published in Europe, I suppose these are of the same kind with those from Siberia."

PRIVATE COLLECTIONS OF IVORIES

There are in the United States many privately owned ivory collections. The finest of these belongs to Henry Walters, of Baltimore, and forms part of his splendid museum on Mt. Vernon Square, one of the most complete on the American continent. Here are shown authentic and characteristic works of Egyptian, Greek, Roman, Byzantine, Carolingian, Early French, Early German, Italian, and Spanish workmanship, as well as some of the later specimens of French work, including the finest examples of Moreau-Vauthier, the greatest modern ivory carver. There are also notable specimens from Japan, China, Siberia, and other Asiatic lands.

One who has principally devoted attention to collecting ivories from the Congo, or made of Congo ivory, is Thomas F. Ryan, of New York, whose efforts were favoured by friendly relations with the late King Leopold II. A masterpiece of Belgian art is a crucifix in which the cross measures 36 in. in length, while the figure of the Crucified is 24 in. high.

In the collection of T. S. Van Volkenburgh are wonder-

fully executed small ivories by Okawa and other Japanese carvers, mounted on specially designed ivory bases. Malcolm MacMartin's collection offers 100 examples, each a gem in itself. Kenyon B. Painter, of Cleveland, in his Trophy Hall has many choice ivories from Zanzibar, British East Africa, southern China, and Hong Kong. Perhaps the largest collection of ivories in the United States is owned by H. J. Heinz, of Pittsburgh, Pa.; many of these are exhibited in the Carnegie Museum in Pittsburgh.

The very extensive collection of the late George A. Hearn, which was shown in 1911 at the Lotos Club in New York City, comprises nearly 700 pieces, all being examples of European ivory carving. The Alfred Duane Pell Collection contains some of the most delicately carved fans of the eighteenth century, with the monogram in the centre and the ivory cut as thin as the finest lace. Among other things is one of the most remarkable sets of chessmen on this continent.

THE ANNUAL ELEPHANT HUNT IN SIAM

The annual elephant hunt at Ayuthia, Siam, is made an official event of considerable importance, for the King is usually present, and if not, a royal representative is there, and the presence of the fashionable world of the capital, Bangkok, makes the occasion a great social function. The wild elephants are driven, by a cordon of tamed ones, from the lower slopes of the Korat and the meadowland around Nakawn Nayok, into a corral especially built outside the city. As a rule the poor beasts have been so harried in the long drive that they are only anxious to have rest and peace. A little trouble is experienced in getting the first elephant into the enclosure, but when this has been accomplished, the others are ready enough to follow, although the huge animals crowd and push against each other in the confusion. It is noteworthy, however, that the young are not trampled

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on; indeed, the very small ones trot along beneath their mothers' bodies and so are out of harm's way.*

THE SALE OF ELEPHANTS

The great dealer in wild animals, Carl Hagenbeck, of Stellingen, near Hamburg, Germany, estimates that since the founding of his business he has sold more than 5,000 elephants, both of the African types and of the Asiatic ones.† An interesting fact communicated by him is that, somewhere on the western battle front in France, a large Burmese elephant, widely known in Germany as "Jenny," is employed in connection with the military operations, presumably for traction.

EXTINCT ELEPHANTS

The tallest of the extinct elephants appears to have been straight-tusked *Elephas antiquus* of Europe, its height being estimated by Pohlig and Pilgrim at from 15 ft. to 16 ft., while the height of the tallest specimen of the North American *Elephas imperator* is a trifle over 13 ft. 6 in., and the southern European *Elephas meridionalis* of the Paris Muséum d'Histoire Naturelle is only 12 ft. 6¾ in. in height. *Elephas columbi* of North America seems to have been considerably shorter, its height ranging from 9 ft. to 11 ft., the latter measurement being three or four inches less than that of the tallest examples of the living African species. As to the mounted museum specimens, Prof. Henry Fairfield Osborn calls attention to the fact that, in most cases, the tips of the dorsal spines have been unduly raised above the superior spine of the scapula, leading to an exaggerated estimate of the true height of the elephant.‡

*H. Warington Smith, "Five Years in Siam," London, 1894, pp. 58, 59.

†Personal communication from Carl Hagenbeck, November 1, 1915.

‡Henry Fairfield Osborn, "Review of the Pleistocene of Europe, Asia, and Northern Africa"; Annals of the New York Academy of Sciences, Vol. XXVI, pp. 215-315, 1915. See pp. 262, 263.

EXCEPTIONALLY FINE EXAMPLE OF TETRABELODON
FROM NEBRASKA*

In June, 1915, a remarkably well-preserved skeleton of *Tetrabelodon* was found in Boyd County, Nebraska. The inferior tusks, with their backing of jaw, are longer than the upper ones, the part protruding beyond the bone being nearly as long. This development of lower tusks seems plainly to have resulted from their progressive use, as a kind of scoop-shovel, to tear up roots, bulbs, and aquatic plants, thus developing, in successive generations, the lower jaw at the expense of the upper one. The skeleton is practically complete, and many of the bones are without a scratch.

CHINESE IVORIES IN SAN FRANCISCO'S CHINATOWN

The technical skill of Chinese ivory carvers is still very notable in our day. A great variety of objects in carved ivory are exported from China to San Francisco, and are to be had in the Chinese shops of the quarter known as Chinatown. As many as from fifty to two hundred of such objects may be seen in any one of the dozens of shops in this district of the city. These ivory carvings comprise round, oval, and square frames, the so-called "magic balls," one within the other, boxes, combs, paper cutters, engraved tusks, and an endless variety of other small and dainty things.

FOSSIL DEPOSITS AT RANCHO LA BREA

See pages 357-359, 412

The deposits of La Brea begin at Wilshire Boulevard and extend eastward for a distance of about 1,200 feet. The seam is not over from one to two acres in width and there are only occasional patches of deposits and not a solid mass of animal remains.

*Communicated by Dr. Erwin H. Barbour.

Recent investigation serves to prove that this region was underlaid with deposits of petroleum and soft asphaltum, and that these deposits were liberated through the natural opening up of earth cracks by earthquakes, or by pressure of the material below; these fissures became filled with soft asphaltum. Especially during the Pleistocene period such breaks appear to have been frequent, and the animals passing over this ground would become entangled in the mass of soft material. As asphaltum is an excellent preservative, the bones have been preserved remarkably well up to the present time, as well as were the human and animal mummies of ancient Egypt.

ELEPHANT HUNTING IN THE SUDAN

See page 208

In the Sudan the natives are allowed to kill elephants in the district in which they have been born and have permanently resided. This is a kind of official acknowledgment of their claim that the particular district belongs to those born there. If, however, a native hunter goes outside of his own province to kill elephants, he has to pay the usual price of £50 for a permit authorizing the killing of but two elephants, and only in case the tusks of the animals killed are exceptionally heavy will the cost of the permit be thereby defrayed, leaving perhaps a little profit. The sporting proclivities of British Government employes in the Sudan are rather discouraged by the administration, for when an employe asks for a vacation and, in answer to the question where he wishes to go, replies that his destination is the South, he is told that the southern climate there is too hot and unhealthy to benefit him, and that his holiday would do him no good unless he went to the North, where, however, there is little game to be found.

One method of hunting used by the natives is to set fire

to the grass after having surrounded an elephant. Every effort of the frightened animal to escape is frustrated by the encircling hunters and finally the elephant is burnt to death. This method of hunting, apart from its cruelty, is very unprofitable, for the flesh of the animal is destroyed and the precious tusks become discolored by the fire and lose much of their value.

THE DANISH CORONATION SEAT IN ROSENBORG CASTLE,
COPENHAGEN, DENMARK
See illustration facing page 292

The pillars sustaining the canopy of this remarkable work of art are narwhal tusks of great length and beauty; other shorter tusks constitute the supports of the seat and of its arms; it is also covered with plates cut from the tusks. Bendix Grodtschilling was the master under whose direction the work was produced. In the earliest notices the Danish writers always call the material "unicorn's horn," rather, perhaps, for the tradition associated with the name than because they were ignorant of its real character and source. An account published in 1747 states that the seat was of unicorn's horn and ivory. Recently an expert examination was made of the material at the instance of Dr. Axel Garboe; this determined finally that no ivory had been used, nothing but narwhal tusks. The silver figures, executed by Ferdinand Kyblisch, are later additions; they personify certain of the virtues.

This royal seat was first used at the coronation of Christian V, June 7, 1671. After the king had been crowned and while he was seated on the chair, or throne, Bishop Johan Wandal delivered a glowing allocution, in the course of which he cited King Solomon's gold and ivory throne, the like of which had never been made before. Then, turning to the King, he proceeded:

“Your Majesty is now seated upon a throne which in material and form rivals that of King Solomon and the like of which cannot be seen in any other realm.”

JAGGING WHEELS*

The Old Dartmouth Historical Society in New Bedford, Mass., has in its Museum Section some 150 examples of “jagging wheels” fashioned out of whale teeth or walrus tusks by whalers on the homeward trip after their catch had been made. These wheels are used in cutting and indenting pastry. The objects testify to a wonderful degree of skill and taste on the part of these amateur carvers, whose work shows in many cases an almost mechanical exactness one would scarcely expect in view of the rude tools employed and the often disturbing conditions of the carvers’ floating workshop.

The objects on view in the Society’s rooms were made in the period between 1800 and 1860, and it is believed that no work of this kind has been done for twenty years or more. The handles of the jagers show an astonishing variety of decorative forms, many of the ornamental designs being in openwork. One of these offers a trefoil, a diamond, and a circle in openwork, while at the end is a five-pointed star. The solid work, however, is the most artistic. In several cases graceful snake forms have been carved; in one of these the convolutions are partly turned about the halberd-like staff of the handle, the upper part of the snake’s body describing four graceful curves above. Other forms are: a hand as terminal; a strangely conceived unicorn; a fantastic creature, half elephant, half dog; a snake head with widely distended jaws, displaying the forked tongue and deadly fangs. The excellent photograph, for which the writer is

*Communicated by Mr. Frank Wood, Curator of the Museum Section, who has been collecting these objects for the past twelve years.



JAGGING WHEELS

MADE BY SAILORS FROM WHALE TEETH OR WALRUS TUSKS

OLD DARTMOUTH HISTORICAL SOCIETY, NEW BEDFORD, MASS.

indebted to Mr. Frank Wood of the Society, will afford a better idea of the unique quality of this work than any further description could do.

NARWHAL*

In general appearance, the narwhal has considerable likeness to the porpoise or white whale, but in spite of its greater size is both of more graceful outline and quicker in its movements. The average weight is from $1\frac{1}{2}$ to 2 tons. The length of the longest one seen so far is stated to be 8 ft. 9 in. The narwhal is chiefly to be found in the waters near Greenland, and in Baffin's Bay and the Arctic Bay; that its range should extend to the Arctic Basin is regarded as improbable, since the requisite supply of small fish is lacking there. This is the more significant in the case of the narwhal because it needs nourishment several times a day, in contradistinction to the shark, for instance, which can live for several days without food. This also accounts for the absence of the narwhal from the ocean waters.

The tameness of these cetaceans is noteworthy. They travel in bands and do not hesitate to come within five or ten feet of a boat, displaying no signs of fear. If shot, a narwhal will sink immediately and cannot be recovered; for this reason the Eskimo hunters try to wound its respiratory organs with a rifle-ball, for if injured in this way, the narwhal will be forced to keep on the surface to breathe, and will remain quiet, and can thus be easily harpooned and secured. From ten to fifteen men are needed to haul it ashore, when it is cut up, and the flesh cached for use as human food. The first layer of skin resembles kid-skin but tears too easily to be available. Then comes from $1\frac{1}{2}$ to 2 in. of black matter, beneath which is a layer of white matter utilized by the

*These interesting details have been communicated to the author by Dr. Henry Ievers of Quebec, Canada. The information was obtained from a particular friend of Captain Bernier, one long connected with the Hudson's Bay Company.

Eskimos in the making of oil, and also for heating and for food purposes; it is said to have a very agreeable taste. As it has little consistency it needs to be cooked or broiled over a very quick and intense fire to prevent disintegration.

In recent years the first narwhal ivory (a few tusks) is said to have been brought in 1854 by the English Expedition. The Eskimos state that on each of his ten voyages Admiral Peary obtained a fairly large quantity of this material. In 1908, Captain Bernier, the Canadian North Pole explorer, took possession of these Arctic regions for Canada. He has made seven trips to these waters, some of them prior to 1908 and others subsequent to that date; he usually requires a year and a half for the journey there and back. What narwhal ivory he has brought is stated to have been disposed of to the Hudson's Bay Company. No narwhals are to be found north of Siberia or Norway, their principal habitat being apparently confined to the Canadian Islands of the Arctic Ocean.

In France, for a long time, it was the custom in the provincial churches to place a narwhal tusk on either side of the altar, running a gas pipe through the hollow part of the tusk, so that the flame could issue from the upper aperture, the whole giving the effect of a gigantic candle.

The following is a list of exact measurements of a consignment of narwhal tusks secured in the Arctic Circle, north of the British possessions:

DIMENSIONS OF 80 NARWHAL IVORY HORNS*

LENGTH		CIRCUMFERENCE LARGE END—CENTRE		LENGTH		CIRCUMFERENCE LARGE END—CENTRE	
<i>Feet</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Feet</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>
8	5½	8½	6¼	5	8	..	..
8	3	8	6½	5	7	..	..
7	8½	7½	5¾	5	6½	7¾	6½
7	7½	7	5¼	5	2	..	..
7	7	8	6	5	1½	5¾	4¼
7	4½	8	5	5	6	7½	6½
7	2	8½	5½	5	7	..	..

*Courtesy of Mr. Henry Ievers, Quebec, Canada.

LENGTH		CIRCUMFERENCE LARGE END—CENTRE		LENGTH		CIRCUMFERENCE LARGE END—CENTRE	
<i>Feet</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Feet</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>
7	1½	8	6¾	5	9	..	..
7	...	7½	6	5	1	..	..
7	...	7¾	6	5	6	..	..
7	...	7¾	6¼	5	0	..	..
6	10½	7	5¼	5	10½	..	..
6	10½	8	5¾	5	8½	..	..
6	10	7	4¾	5	3	..	..
6	7	..	..	4	8½	..	..
6	10	7	5¼	4	3	..	..
6	8½	7½	4¾	4	1	4¼	3¼
6	8	..	..	4	1½	..	..
6	4	..	..	4	7	..	..
6	9	7½	5¾	4	8	..	..
6	4	..	..	4	4	5½	4½
6	7	..	..	4	3	..	..
6	1	..	..	4	3	..	..
6	5½	..	..	4	4	..	..
6	3	..	..	4	9½	..	..
6	0	..	..	4	11	..	..
6	2	..	..	4	10	..	..
6	5	..	..	5	7½	..	..
6	2½	8¼	6	3	10	..	..
6	0½	8½	6¾	3	8	..	..
6	1	..	..	3	11	..	..
6	10	..	..	3	7	..	..
6	6	..	..	3	1	..	..
6	8	..	..	4	11	..	..
6	3½	..	..	3	6	4¼	3½
6	0½	..	..	3	8	..	..
6	9	7¾	5½	3	9½	..	..
6	0½	..	..	2	11	3⅝	3⅝
6	0½	..	..	2	5½	..	..
5	9½	..	..	4	1	..	..

The material was worth, on an average, \$2.50 a pound. The total weight of the 80 tusks listed was 680 pounds. The heaviest weighed 17 pounds 4 ounces and was 8 ft. 5½ in. long, an altogether exceptional length, with a greatest circumference of 8½ in.; another measured 8 ft. 3 in. in length, with a weight of 14 pounds 10 ounces and a greatest circumference of 8 in.; a heavier tusk, weighing 15 pounds 14 ounces, or close to 16 pounds, was 7 ft. 7¾ in. in length. A tusk weighing 14¾ pounds was but 6 ft. long, while an-

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other, weighing but an ounce less, measured 7 ft. 7 in. in length. The average weight for each of the 80 tusks was $8\frac{1}{2}$ pounds and the average length 5 ft. 9 in.

MEMORIAL TABLETS

As ivory is such an enduring material, the writer suggests its use for short memorial inscriptions, engraved on a small, artistically designed tablet, to be placed in the hand of a deceased person and interred with the body, thus providing a lasting and beautiful record of the identity, birth-place, and dates of birth and death.



THE TRIUMPH OF CÆSAR, FROM A PAINTING BY ANDRÉ MARTINEAU. The Boys Armed with Hammers (Instruments of Sacrifice) Care for the Candelabra by Whose Light the Roman Heroes Are to Ascend to the Capitol

Courtesy of the Edison Monthly

PROBOSCIDEA GENERA*

DIBELODON. Cope, 1884.
Pal. Bull. No. 39, p. 2; Proc. Am. Phil. Soc., XXII, pt. 1, 2-8, Jan., 1885.
Type *Mastodon shepardi* Leidy. Contra Costa Co., Cal. Last inferior molar.
Two-dart+tooth; enamel bands on upper tusks.

DINOTHERIUM (= *Deinotherium*, preferred). Kaup, 1829.
Oken's Isis, 1829, 401-404.
Type *Deinotherium giganteum*, Kaup.
= *Anteotherium*, Falconer, 1868. Pal. Mem., I, 416.
Terrible+wild beast.

ELEPHAS. Linnæus, 1758.
Systema Naturæ, 10th ed., I, 33, 1758.
Type *Elephas maximus* Linnæus, from Ceylon [Zeylona].

EUBELODON. Barbour, 1914.
Neb. Univ. Studies, XIV, No. 2, p. 10.
Type *E. morrilli*, from Neb. (Devil's Gulch).
Elongated mandible *without* tusks; upper tusks *without* enamel bands.
Well-tusked.

EUELEPHAS (Subg. of *Elephas*).
Falconer, 1857.
Q. J. G. S., Lond., XIII, pt. 4, pp. 315, 317-318, Nov. 1, 1857.
W. L. Sclater, Mamm. S. Africa, I, 317, 1900.
New name for *Elasmodon*, Falconer, 1846, preoccupied. Spp. 9: 1 living and 8 extinct.
Type *Elephas planifrons* F. and C., Siwalik.
Well (typical)+elephant.

GAMPHOTHERIUM. Gloger, 1841.
Hand-u. Hilfsbuch Naturgesch., I, pp. xxxii, 119, 1841. Thomas, Ann. & Mag.

Nat. Hist., 6th Ser., XV, 191, 192, Feb. 1, 1895.
Type *Mastodon angustidens* Cuvier. Miocene, France. See *Gomphotherium* Burmeister, 1837.
Bolt+wild beast—in allusion to the conical tubercles of the molars.

GOMPHOTHERIUM. Burmeister, 1837.
Handbuch Naturgesch., 795, 1837.
Type not mentioned; characterized by tusks in both jaws. See *Gamphotherium*.

HEMIMASTODON. Pilgrim, 1912.
Pal. Indica, new ser., IV, Mem. 2.

LOXODONTA. Cuvier, 1827.
Zool. Jour., III, 140, Jan., 1827.
"Loxodonte," Cuvier, Hist. Nat. Mamm., VI, Livr. LI, pl., Nov., 1825.
= *Loxodon*, Falconer, 1857. Q. J. G. S. Lond., XIII, pt. 4, pp. 314-315 (pre-occupied).
= *Loxo* (-disco)-don. Pohlig, Nova Acta Acad. Caes. Leop.-Carol., LIII, Nr. 1, pp. 138, 252, 1888.
Type *Elephas africanus* Blum., from Africa.
Slanting+tooth.

MAMMUT. Blumenbach, 1799.
Handbuch Naturgeschichte, 6th ed., p. 698.
Type *Mammot ohioiticum* Blumenbach (= *Elephas americanus* Kerr, 1792), based upon remains from the Pleistocene of Ohio River.
Mammut: Tartar word Mammantu, "ground dweller" (refers to Mammoth).

MASTODON. Cuvier, 1817.
Ann. Mus. Hist. Nat., VIII, 270, 288, pls. 49-56 (1806), 1817; Règne Animal, I, 232-233, 1817.

*These lists of genera and species of Proboscidea, as well as references to the sources, have been furnished by Prof. Richard S. Lull of Yale University. The classification as here given is based on the literature alone and not on any study of the material, and for that reason it should not be regarded as other than a tentative arrangement.

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= *Mastodontum*, Blainville, 1817, Nouv. Dict. Hist. Nat., IX, 276.
Spp. *Mastodon giganteus* and *M. angustidens* Cuvier. Name antedated by *Mammot* Blum., 1799.
Breast+tooth.

MEGABELODON (Subg. of *Tetrabelodon*).
Barbour, 1914.

Neb. Geol. Surv., IV, pt. 14, p. 217.
Type *Tetrabelodon lulli* Barb.

MOERITHERIUM. Andrews, 1901.
Tageblatt des V. Int. Zool. Cong. Berlin, No. 6, 4, Aug. 16; Geol. Mag., Lond., Dec. IV, VIII, pp. 403-406.
Type *Moeritherium lyonsi* And., Fayûm.
Moeris+wild beast.

PALEOMASTODON. Andrews, 1901.
Zoologist, London, 4th ser., V, p. 319, Aug. 15, 1901.
Type *P. beadnelli* And., from Fayûm.
Ancient+mastodon.

RHABDOBUNUS. Hay, 1914.
Iowa Geol. Surv., XXIII, pp. 373-374.
Type *Mastodon mirificus* Leidy.

STEGODON (Subg. of *Elephas*). Falconer, 1857.
Q. J. G. S., Lond., XIII, pt. 4, pp. 314, 318, Nov. 1, 1857.
—*Stego (lopho-)don*. Pohlig, Nova Acta Acad. Caes. Leop.-Carol., LIII, Nr. 1, p. 252, 1888.
Spp. 7: *Elephas cliftii* F. and C., *E. bombifrons* F. and C., *E. ?ganesa* F. and C., *E. insignis* F. and C., from Miocene and Pliocene, India, etc.
Cover+tooth.

TETRABELODON. Cope, 1884.
Proc. Am. Phil. Soc., XXII, pt. 1, Jan., 1885, 4-5.
Type *Mastodon angustidens* Cuvier. See *Gamphotherium* Gloger, 1841.
Both upper and lower tusks, in contrast to *Mastodon*, in which lower incisors are wanting, or vestigial in male. Cf. *Dibelodon*.
Four+dart+tooth.

TETRACAULODON. Godman, 1890.
Trans. Am. Philos. Soc., n. s., III, 478-485.
Type *Tetracaulodon mastodontoides*, found 12 miles from Newburgh, Orange Co., N. Y. = *Mammot americanum*.
Four+stem+tooth (tusk).

TETRALOPHODON. Falconer, 1857.
Q. J. G. S., Lond., XIII, pt. 4, pp. 312-314, 316-317, synoptic table.
Spp.: 15 from Miocene and Pliocene: *Mastodon longirostris* Kaup, *M. arvernensis* C. and J., *M. andium* Cuvier, *M. sisalensis* Cautley, *M. latidens* Clift, and *M. perimensis* F. and C., etc.
Four+crest+tooth.

TRILOPHODON. Falconer and Cautley, 1846.
Fauna Antiqua Sivalensis, 54, 1846; Falconer, Q. J. G. S., Lond., XIII, pt. 4, pp. 312-314, 316-317.
7 spp. from Upper Miocene and Pliocene: *Mastodon angustidens* Cuv., *M. ohoticus* (Blumenbach), *M. humboldtii* Cuv., *M. tapiroides* Cuv., *M. borsoni* Hayes, *M. pandionis* Falc., *M. pyrenaicus* (Lartet Ms.).
Three+crest+tooth.

PROBOSCIDEA SPECIES

MOERITHERIIDÆ

MOERITHERIUM GRACILE Andrews.
1902 Geol. Mag. (4) IX, p. 292.
1906 Cat. Fayûm, pp. 127-128.
Middle Eocene, Fayûm, Egypt.

MOERITHERIUM LYONSI Andrews.
1901 Tageblatt des V. Int. Zool. Cong. Berlin, No. 6, p. 4. Geol. Mag., Lond., Dec. IV, Vol. VIII, pp. 403-406.
1906 Cat. Fayûm, pp. 120-126.
Middle and Upper Eocene. Fayûm, Egypt.

MOERITHERIUM TRIGONODON Andrews.
1904 Geol. Mag. (5) I, p. 112.
1906 Cat. Fayûm, pp. 128-129.
Upper Eocene. Fayûm, Egypt.

MOERITHERIUM SP. Andrews.
1906 Cat. Fayûm, p. 129.
=? *M. lyonsi*.
Middle Eocene. Fayûm, Egypt.

DINOTHERIIDÆ

DINOTHERIUM GIGANTEUM Kaup.
Oken's Isis, 1829, 401-404, Pl. I.
= *Dinotherium* Kaup. Das Thierreich, I, 268-270, 1835.
= *Dinotherium cuvieri* Kaup. 1832.
= *D. medium* Kaup. 1833.
= *D. bavaricum* H. v. Meyer. 1833.

= *D. proavum* Eichwald. 1835.

= *D. koenigi* Kaup. 1841.

Middle Miocene to Lower Pliocene. Switzerland, France, Greece, Styria, Russia, Spain, Austria-Hungary, Germany.

DINOTHERIUM GIGANTISSIMUM
Stefanescu.

1892 Bull. Geol. Soc. America, III, pp. 81-83.

1894 Ann. Mus. Bucaresci, p. 126.

1907 Comptes Rendus, Intern. Geol. Cong. Mexico, p. 417.

DINOTHERIUM INDICUM Falconer.

1845 Q. J. G. Soc., Lond., I, p. 361.

Incl. *D. pentapotamiae* Lydekker, 1876.

Pal. Indica (Mem. G. S. Ind.), Ser. 10, Vol. I, p. 72.

—*Antioletherium* Falconer, 1868. Pal. Mem., I, p. 416, pl. xxxiv, figs. 1, 2.

Pliocene; Upper Miocene? India.

DINOTHERIUM SINDIENSE Lydekker.

1880 Pal. Indica (Mem. Geol. Surv. India), Ser. 10, Vol. I, p. 196.

Lower Pliocene or Upper Miocene. Western India.

ELEPHANTIDÆ

MASTODONTINÆ

(MASTODONS)

PALEOMASTODON BEADNELLI Andrews.

1901 Tageblatt des V. Int. Zool. Cong. Berlin, No. 6, p. 4.

1906 Cat. Fayûm, pp. 150-156.

Upper Eocene. Fayûm, Egypt.

PALEOMASTODON MINOR Andrews.

1904 Geol. Mag. (5), I, p. 115.

1906 Cat. Fayûm, pp. 168-169.

Upper Eocene. Fayûm, Egypt.

PALEOMASTODON PARVUS Andrews.

1905 Geol. Mag. (5), II, p. 562.

1906 Cat. Fayûm, pp. 162-168.

Upper Eocene. Fayûm, Egypt.

PALEOMASTODON WINTONI Andrews.

1905 Geol. Mag. (5), II, p. 563.

1906 Cat. Fayûm, pp. 156-162.

Upper Eocene. Fayûm, Egypt.

GOMPHOTHERIUM (MASTODON)
ANGUSTIDENS Cuvier.

1806 Ann. du Muséum, VIII, p. 412;
"Mastodonte à dents etrcites."

= *Mastodon cuvieri* Pomel, 1848, Bul. Soc. Géol. France, Ser. 2, Vol. V, p. 258.

= *Mastodon simorreensis* Lartet, 1851. Notice sur la colline de Sansan, p. 24.

= *Mastodongaujaci* Lartet, 1851. Ibid., p. 27.

= *Mastodon pyrenaicus* Falconer, 1857. Q. J. G. S. Lond., XIII, table opp. p. 319.

= *Tetrabelodon angustidens* Cope, 1884. Proc. Am. Phil. Soc., XXII, p. 5.

Middle Miocene. France, Switzerland, Bavaria, Styria, India (N. W.), Bohemia, Austria-Hungary.

GOMPHOTHERIUM (MAMMUT)
BREVIDENS (Cope).

1889 Am. Nat., XXIII, pp. 199, 200, 201 (*Tetrabelodon*).

= *Mastodon proavus* Cope, 1884. Ibid., XVIII, p. 525.

Miocene. Montana.

GOMPHOTHERIUM (MAMMUT)
CHAPMANI (Cope).

1874 Proc. Acad. Nat. Sci. Phila., p. 222 (*Mastodon*).

= *Mastodon obscurus*?

Loc. Unknown. May be American.

GOMPHOTHERIUM CONODON Cook.

1909 Am. Jour. Sci. (4) XXVIII, pp. 183-184.

= *Tetrabelodon*.

Lower Miocene. Agate, Nebraska.

GOMPHOTHERIUM (MAMMUT)
EUHYPODON (Cope).

1884 Am. Nat., XVIII, pp. 524, 525 (*Mastodon*).

= *Tetrabelodon euhypodon* (Cope), 1889, Am. Nat., XXIII, pp. 195, 202.

Miocene. Kansas.

GOMPHOTHERIUM (MASTODON)
FALCONERI Lydekker.

1877 Rec. Geol. Surv. India, X, p. 83.

Pliocene. India (Punjab and Sind).

GOMPHOTHERIUM (MAMMUT)
FLORIDANUM (Leidy).

1886 Proc. Acad. Nat. Sci. Phila., p. 11 (*Mastodon*).

= *Tetrabelodon floridanus* (synonym(?) of *T. serridens* Cope).

Pliocene. Florida.

GOMPHOTHERIUM (TETRABELODON)
LULLI Barbour.

915 Am. Jour. Sci. (4) XXXIX, pp. 87-92. Neb. Geol. Surv., IV, pt. 14.

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Subg. name *Megabelodon* proposed.
Pliocene. Nebraska (Snake River).

GOMPHOTHERIUM (MAMMUT)
OBSCURUM (Leidy).

1869 Jour. Acad. Nat. Sci. Phila. (2) VII,
p. 396 (*Mastodon*).
Miocene. Maryland, N. Carolina, S.
Carolina, Colorado (Plihippus beds).

GOMPHOTHERIUM (MASTODON)
PANDIONIS Falconer.

1868 Palaeontological Memoirs, I, p. 124.
= *Tetrabelodon pandionis* Cope, 1884. Proc.
Am. Phil. Soc., XXII, p. 5.
Pliocene (Upper Miocene?). India (Perim
Island, Sind?, Punjab, N. W. frontier),
China.

GOMPHOTHERIUM (MASTODON)
PENTELICI Gaudry and Lartet.

1856 Comptes Rendus, XLIII, p. 273
(*M. pentelicus*).
= *Tetrabelodon pentelici* Cope. Proc. Am.
Phil. Soc., XXII, p. 5, 1884.
Lower Pliocene (Pikermi). Greece, Hun-
gary, N. W. Persia.

GOMPHOTHERIUM (MAMMUT)
PROAVUM (Cope).

1873 Syn. new Vert. Tert. Colo., p. 10
(*Mastodon*).
Miocene. Kansas, Nebraska, Colorado,
New Mexico.

GOMPHOTHERIUM (MAMMUT)
PRODUCTUM (Cope).

1874 Proc. Acad. Nat. Sci. Phila., p. 221
(*Mastodon*).
= *Tetrabelodon productus* Matthew.
Miocene. New Mexico.

GOMPHOTHERIUM (MAMMUT)
SERRIDENS (Cope).

1884 Am. Nat., XVIII, pp. 524, 525
(*Mastodon*).
= *Tetrabelodon serridens* Matthew.
Miocene. Texas.

GOMPHOTHERIUM (MAMMUT)
SHEPARDI (Leidy).

1870 Proc. Acad. Nat. Sci. Phila., p. 98
(*Mastodon*).
= *Dibelodon shepardi* Cope.
= *Tetrabelodon shepardi* Matthew.
Pliocene. California, Texas, Kansas,
Mexico.

GOMPHOTHERIUM (MASTODON)
TURICENSIS Schinz.

1833 Denkschr. schw. Ges. Nat., Vol. I,
pt. 2, p. 59.
= *Mastodon tapiroides* auct.
= *Tetrabelodon turicensis*, Cope, 1884. Proc.
Am. Phil. Soc., XXII, p. 5.
Middle Miocene. France, Germany,
Austria-Hungary, Russia.

GOMPHOTHERIUM (TETRABELODON)
WILLISTONI Barbour.

1914 Univ. Nebraska Studies, XIV, No. 2,
pp. 8-10.
Pliocene. Nebraska.

EUBELODON MORRILLI Barbour.

1914 Univ. Neb. Studies, XIV, No. 2, pp.
10-13.
Pliocene. Nebraska.

TETRALOPHODON (MASTODON)
ARVERNENSIS Croizet and Jobert.

1828 Oss. Foss. d. Puy-de-Dôme, p. 138.
= *Mastodon brevirostris* Gervais, 1854.
Ann. Sc. Nat. (3) V.
= *Mastodon dissimilis* Jordan, 1858. Ann.
Soc. Agric. Lyon (3) II.
= *Anancus macroplus* Aymard, 1854. Ann.
Soc. Agric. Sci. de Puy, p. 597.
Lower Pliocene, Upper Pliocene. France,
Italy, Germany, Croatia, etc., and Red
Crag of England.

TETRALOPHODON (MASTODON)
ATTICUS Wagner.

1857 Abh. math.-phys. Cl. k.-bay. Ak.
Wiss., viii, pt. 1, p. 140.
Allied to *M. longirostris*—more specialized,
symphysis unknown. H. Woodward.
Lower Pliocene (Pikermi). Greece.

TETRALOPHODON (MAMMUT)
CAMPESTER (Cope).

1878 Proc. Am. Phil. Soc., XVII, p. 225
(*Tetralophodon*).
= *Tetrabelodon campester* Cope.
= *Mastodon campester* Cope.
Miocene. Kansas, Nebraska.

TETRALOPHODON (MASTODON)
CAUTLEYI Lydekker.

1886 Palaeontologia Indica (Mem. Geol.
Surv. India), ser. 10, III, p. xiv.
Pliocene. India (Perim Island).

TETRALOPHODON (MASTODON)
CORDILLERUM Cuvier.

1806 Ann. d. Muséum, VIII, p. 413, "*Mastodonte des Cordilières*."
= *Mastodon cordillerarum*, Demarest, 1822. Mammalogie, p. 385.
= *Mastodon andium*, Cuvier, 1824. Oss. Foss., 2d. ed., V, pt. 2, p. 527.
= *Mastodon australis* Owen, 1844. Ann. Mag. Nat. Hist., Ser 1, Vol. XIV, p. 269.
= *Tetrabelodon andium*, Cope, 1884, Proc. Am. Phil. Soc., XXII, p. 5.
Pleistocene. Chili, Bolivia, Peru, Mexico, Texas.

TETRALOPHODON (MAMMUT)
HUMBOLDTI (Cuvier).

1806 Ann. du Muséum, VIII, p. 413 (*Mastodon humboldti*).
= *Mastodon humboldti*, Cuvier, loc. cit.
= *Dibelodon humboldti*, Cope, 1884. Proc. Am. Phil. Soc., XXII, p. 5.
Pliocene. Colombia, Argentina, Uruguay, Brazil, Texas.

TETRALOPHODON (MASTODON)
LATIDENS Clift.

1828 Trans. Geol. Soc., Ser. 2, Vol. II, pt. 3, p. 371.
Pliocene. India (Perim Is., Sind, Punjab, Siwalik Hills), Burma, Borneo.

?**TETRALOPHODON (MASTODON)**
LONGIROSTRIS Kaup.

1835 Oss. Foss. d. Darmstadt, pt. 4, p. 65.
= *Tetrabelodon longirostris*, Cope, 1884. Proc. Amer. Phil. Soc., XXII, p. 5.
Lower Pliocene. England, France, Germany, Austria-Hungary.

TETRALOPHODON (MAMMUT)
MIRIFICUS (Leidy).

1858 Proc. Acad. Nat. Sci. Phila., p. 10 (*Mastodon*).
= *Tetralophodon mirificus* (Leidy), 1858, Ibid., p. 28.
= *Dibelodon mirificus*, Matthew, 1899, Bull. A. M. N. H., XII, p. 69.
= *Rhabdobunus mirificus* Hay, 1914, Iowa Geol. Surv., XXIII, pp. 373, 374.
Miocene. Nebraska, Texas, Iowa.

TETRALOPHODON (MASTODON)
PERIMENSIS Falconer and Cautley.

1847 Fauna Antiqua Sivalensis, pt. 4, pl. xxxi.

= *Tetrabelodon perimensis*, Cope, 1884, Proc. Amer. Phil. Soc., XXII, p. 5.
Pliocene. India (Perim Island), China (?).

TETRALOPHODON (MAMMUT)
PRÆCURSOR (Cope).

1893 4th Ann. Rept. Geol. Surv. Texas, p. 64 (*Dibelodon*).
= *Mastodon præcursor* Cope, 1892 (no descrip.).
Pliocene, Miocene. Texas.

TETRALOPHODON (MASTODON)
PUNJABIENSIS Lydekker.

1886 Cat. Foss. Mamm. in British Museum, pt. 4, p. 60.
Pliocene. India (Punjab).

TETRALOPHODON (MAMMUT)
RUGOSIDENS (Leidy).

1890 Proc. Acad. Nat. Sci. Phila., p. 184 (*Mastodon*).
Upper Pliocene. South Carolina.

TETRALOPHODON (MASTODON)
SIVALENSIS Cautley.

1836 Journ. As. Soc. Beng., V, p. 294, as var. of *M. angustidens*.
Lower Pliocene. India (Siwalik Hills and Punjab).

TETRALOPHODON (MAMMUT)
TROPICUM (Cope).

1884 Proc. Am. Phil. Soc., XXII, p. 7 (*Dibelodon*).
= *Dibelodon* Matthew.
= *Mastodon successor* Cope, 1892.
Pliocene. Texas.

MAMMUT AMERICANUM (Kerr).

1792 Anim. Kingdom, p. 116 (*Elephas americanus*).
= *Mastodon americanus* (Kerr).
= *Mastodon ohioticus*.
= *Mastodon giganteus*, Cuvier, 1817.
= *Mastodon maximus*.
= *Trilophodon ohioticus*, Cope, 1868.
= *Tetracaulodon ohioticus*.
= *Missourium kochii*, *theristocaulodon*.
= *Tapirus mastodontoides*, Giebel, 1847.
Pleistocene. North America.

MAMMUT BORSONI Hays.

1834 Trans. Am. Phil. Soc., ser. 2, IV, p. 334.
= *Mastodon buffonis*, Pomel, 1848, Bull. Soc. Géol. Fr., ser. 2, V, p. 258.

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= *Mastodon virgatidens*, Meyer, 1867. Palæontographica, XVII, p. 61.
Pliocene. Europe.

MAMMUT PROGENIUM Hay.

1914 Iowa Geol. Surv., XXIII, pp. 368-373.
= *Mammut americanum* Calvin 1909.
= *Mastodon americanus* Calvin 1911.
Pleistocene, Iowa.

ELEPHANTINÆ

(TRUE ELEPHANTS AND STEGODONS)

ELEPHAS (STEGODON) AIRAWANA Martin.

1890 Nat. Verh. K. Akad. Wiss., Amsterdam, p. 4.
Pliocene. Java.

ELEPHAS (STEGODON) BOMBIFRONS Falconer and Cautley.

1846 Fauna Antiqua Sivalensis, pt. 1, p. 46.
Pliocene. India (Punjab to Siwalik Hills)?
China, ?Java.

ELEPHAS (STEGODON) CLIFTI Falconer and Cautley.

1846 Fauna Antiqua Sivalensis, pt. 1, p. 47.
= *Mastodon elephantoides* Clift, 1828.
= *Stegodon sinensis* Owen, 1870.
= *Stegodon clifti*, Naumann, 1881.
Lower Pliocene (Siwalik). Burma, China,
Japan, India (Siwalik Hills and Punjab).

ELEPHAS (STEGODON) GANESA Falconer and Cautley.

1846 Fauna Antiqua Sivalensis, pt. 1, p. 45.
1876 Rec. Geol. Surv. India, IX, p. 48.
Pleistocene, Lower Pliocene (Siwalik).
India (Punjab and Siwalik Hills, and
Narbada Valley).

ELEPHAS (STEGODON) INSIGNIS Falconer and Cautley.

1846 Fauna Antiqua Sivalensis, pt. 1, p. 37.
= *Mastodon elephantoides*, Clift, 1828 (in
part).
= ?*Stegodon orientalis* Owen, 1870.
= *Stegodon insignis* Naumann, 1881.
Lower Pliocene (Siwalik). Burma, China,
Java, Japan, India (Punjab and Siwalik?),
Pleistocene of Narbada Valley.

ELEPHAS (STEGODON) MINDANENSIS Naumann.

1890 Zeitsch. d. geol. Ges., Vol. XLII, p.
166.
Pliocene. Philippines.

ELEPHAS (STEGODON) TRIGONOCEPHALUS Martin.

1887 Samml. geol. Reichsmus, Leyden, IV,
pt. 2, p. 36.
Pliocene. Java.

ELEPHAS (LOXODONTA) AFRICANUS Blumenbach.*

Recent. Africa.

ELEPHAS (LOXODONTA) AFRICANUS ALBERTENSIS Lydekker.

Skull unusually short and broad.
1907 Brit. Mus. Guide Great Game An.,
p. 72.
Recent. Albert Nyanza.

ELEPHAS (LOXODONTA) AFRICANUS CAPENSIS Matschie.

Ears enormous (4 ft. 5 in. x 4 ft. in ♀ 8½ ft.
high), somewhat square in shape, rounded
corners, and small, sharply pointed angular
lappet in front. Forehead falls away
toward temples, so as to appear highly
arched.
1907 Brit. Mus. Guide Great Game An.,
p. 72.
Recent. South Africa.

ELEPHAS (LOXODONTA) AFRICANUS CYCLOTIS Matschie.

Ears very large, oval, lappet in front a half-
ellipse. Skin mosaic-like in appearance—
colour paler gray than *oryotis*.
1907 Brit. Mus. Guide Great Game An.,
p. 72.
Recent. Western Africa, typically from
southern Cameroons.

ELEPHAS (LOXODONTA) AFRICANUS KNOCKENHAUERI Matschie.

Smaller ears than *oryotis*, triangular front
lappet angulated and pointed (4 ft. 2½ in.
x 5 ft. 3 in.).
1907 Brit. Mus. Guide Great Game An.,
p. 72.
Recent. German East Africa.

ELEPHAS (LOXODONTA) AFRICANUS OXYOTIS Matschie.

Ears considerably smaller than *cyclotis*,
semicircular, front lappet very sharply
pointed and angular.

*For additional varieties of this species see pages
83, 384 of the present work.

1907 Brit. Mus. Guide Great Game An.,
p. 72.
Recent. Sudan.

ELEPHAS (LOXODONTA) AFRICANUS
FUMILIO Noack.

1906 Ann. Mag. Nat. Hist. (7) XVII, pp.
501-503.
Height not over 7 feet.
Recent. Africa, Congo.

ELEPHAS (EUELEPHAS) ANTIQUUS
Falconer.

1857 Q. J. G. S. Lond., XIII, table facing
p. 319.
1847 Fauna Antiqua Sivalensis, pl. xiv B.
= *Elephas (Loxodon) priscus* Falc. and
Caut., 1846, pt. 2, pl. xiv.
?Lower Pleistocene, Pliocene. England,
France, Italy.

ELEPHAS (EUELEPHAS) ARMENIACUS
Falconer.

1857 Q. J. Geol. Soc. Lond., XIII, table
facing p. 319. Palæontol. Mem., II, pp.
247-248, pl. x, fig. 3.
1863 Nat. Hist. Rev., p. 75, pl. ii, fig. 2.
Intermediate between *primigenius* and
indicus. Leith-Adams, Mon. Pal. Soc.,
"Brit. Foss. Eleph.," p. 241.
Armenia.

ELEPHAS ATLANTICUS Pomel.
1879 Bull. Soc. Géol. France, Sér. 3, Vol.
VII, p. 51.
Intermediate between *E. antiquus* and *E.*
africanus.
Pleistocene. North Africa.

ELEPHAS (EUELEPHAS) COLUMBI
Falconer.

1857 Q. J. G. S. Lond., XIII, table facing p.
319.
= *E. texianus* Blake 1862.
= *E. primigenius columbi* Cope 1874.
= *E. jacksoni* Mather 1838.
Pleistocene. North America.

ELEPHAS CYPRIOTES Bate.
Proc. R. Soc. Lond., LXXI, pp. 498-500,
1903.
Geol. Mag. (5) I, pp. 325-326, 1904.
Phil. Trans. R. Soc. Lond., Vol. CXCVII B,
pp. 347-360, 2 pls., 3 figs.
Pleistocene. Cyprus. Cave deposit.

ELEPHAS (EUELEPHAS) HAYI
Barbour.

1915 Am. Jour. Sci. (4) XL, Aug., 1915,
pp. 129-134, 5 text figs.
Pleistocene. Nebraska.

ELEPHAS (EUELEPHAS) HYSUDRICUS
Falconer and Cautley.

1846 Fauna Antiqua Sivalensis, pt. I, p. 41.
= *Euelephas hysudricus* auct.
Lower Pliocene (Siwalik). India (Pliocene
of Siwalik Hills and Punjab, and Pleisto-
cene of Narbada Valley).

ELEPHAS (EUELEPHAS) IMPERATOR
Leidy.

1858 Proc. Acad. Nat. Sci. Phila., p. 10.
Pleistocene. United States, Mexico.

ELEPHAS (EUELEPHAS) INDICUS Linnæus.
= *Elephas maximus* Lin.
Recent. India, Indo-China, East Indies.

ELEPHAS JOLENSIS Pomel.
1895 Pal. Mon., Carte Géol. Algérie, p. 32.
Algeria.

ELEPHAS MELITENSIS Falconer.
1862 "Parthenon," Oct. 18, p. 780.
= *Loxodon melitensis* auct.
Including *E. falconeri* Busk, 1867 (3 ft. high).
Trans. Zool. Soc. Lond., VI, p. 251 (1867
read 1865).
Pleistocene. Malta, ?North Africa.

ELEPHAS (EUELEPHAS) MERIDIONALIS Nesti.
1825 Nuov. Giorn. Letter., p. 195, *teste*
Meyer.
Leith-Adams, Mon. Pal. Soc., p. 208.
Upper Pliocene. England, Red Crag to
Forest Bed. Tuscany, Middle and
South Europe, and (prob.) North Africa.

ELEPHAS MNAIDRIENSIS Leith-
Adams.

1870 Notes of a Naturalist in the Nile Valley
and Malta, p. 224.
Name originally *E. mnaidra*, but was
amended by its author in 1874. Trans.
Zool. Soc. Lond., IX, p. 116.
Average height 6-7 ft.
Pleistocene. Malta. Caverns and rock
fissures.

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ELEPHAS NAMADICUS Falconer and
Cautley.

1846 Fauna Antiqua Sivalensis, pt. 2, pl.
xiii.

= *Euelephas namadicus* auct.

Pleistocene. India, Burma, China, Japan.

ELEPHAS PLANIFRONS Falconer
and Cautley.

1846 Fauna Antiqua Sivalensis, pt. 1, p. 38.

= *Loxodon planifrons*, auct.

Lower Pliocene (Siwalik). India (Siwalik
Hills and Punjab).

ELEPHAS (EUELEPHAS) PRIMIGENTUS
Blumenbach.

1803 Handb. Naturg., 1st French ed., II,
p. 407.

Pleistocene. North Europe, Asia, North
America.

ELEPHAS SIVALENSIS

? = *Mastodon sivalensis*?

Lower Pliocene (Siwalik).

ELEPHAS TROGONOTHERII Pohlig.

1884 Sitz. niederrhein. Ges., Feb. 4, 1884.

W. Soergel, Palaeontographica, Vol. LX,
1912.

Silesia.

IVORY CARVERS OF ALL LANDS AND OF ALL TIMES

AARTS, A. Sculptor. Exhibited at Brussels Exposition. Head of Laughing Child.

ADYE, THOMAS. Sculptor. Worked in London in the eighteenth century, and executed small objects in ivory there from 1737 to 1744.

AGNESIUS, JACOBUS. Born in Calw in Württemberg. His name is signed with the date 1638 on a representation of the martyrdom of St. Bartholomew, now in the Museum of Albi, Italy.

ALBERT, ———. Exhibited spinning wheel at Musée Galliéra in 1903.

ALGARDI, ALESSANDRO. Sculptor. Born in Bologna in 1692; died at Rome, June 10, 1654. Was a pupil of Ludovico Caracci and was considered the finest sculptor of the seventeenth century. In ivory his principal works were crucifixes, a splendid example being one attributed to him in the Reiche Kapelle in Munich.

ALKAMENES, ———. Executed ivory and gold statue of Dionysos Eleutherios.

ALLOUARD, HENRI. Exhibited "Chrysis Victrix" at the Musée Galliéra in 1903 and a group "La Lecture Interrompue." In the Salon of 1908 he had a statuette, "Les deux amis," of ivory, marble, and stone, and in the Salon of 1909, a statuette of bronze, stone, marble, and ivory, called "Le Gué," and a group entitled "Colin-Maillard" of marble and ivory.

ALTORF, JOHANN. Sculptor. Born in the Hague, January 6, 1876. Worked for seven years with the sculptors Alexandre and Engels. Executed in ivory and in oak figures of elephants, monkeys, camels, lions, owls, etc.; sometimes combining the two materials.

ANDERSEN, HALVOR, surnamed "Halvor the Devil." Made sculptures in ivory at Brageruais in the eighteenth century. Works by him in the royal Danish collections in Copenhagen.

ANGEMAIR, CHRISTOPH. Born in Walheim near Munich; died in Munich in 1633. Came at an early age to Munich where he was in the service of Elector Maximilian I until 1631, when he was pensioned.

ANGUIER, MICHEL. Sculptor. Born in Eu, Normandy, September 28, 1612; died July 11, 1686. Belonged to the Dieppe school of ivory carvers. His principal work was a crucifix for the high altar of the Sorbonne executed in 1668.

ARZT BROTHERS. Carvers of the Erbach (Odenwald) school in the middle of the eighteenth century.

AUBERT, PIERRE. Died before 1408; was living in Toulouse in 1380.

AUBERT, JEAN. Employed by Dukes of Burgundy in the fourteenth century.

BARBETTI, RAFAELLO. Italian wood and ivory carver. Born in Siena in 1828. Received several medals.

BARBETTI, RINALDO. Italian wood and ivory carver. Born in Siena in 1830; died in Florence in 1903.

BARILLOT, EUGÈNE. Born in Berlin in 1841. Ivory and bronze work. "The Pied Piper of Hamelin," "The Trumpeter of Sakkingen," etc.

BARRÉ, JEAN AUGUST. Sculptor. Born in Paris, September 25, 1811; died in Paris in 1896. Produced a beautiful ivory statuette of Rachel. Pupil of his father, Jean Jacques Barré.

BARRIAS, ———. Exhibited in Musée Galliéra, 1903. "Jeune Fille de Boussada."

BARTHEL, MELCHIOR. Sculptor. Born in Dresden, December 10, 1625; died in Dresden, November 12, 1672. Worked first in Ulm and then for seventeen years in Venice. Works in Grüne Gewölbe, Dresden; also crucifix in National Museum, Florence.

BARTHÉLEMY, ———. Exhibited in Musée Galliera, 1903.

BATES, HARRY. "Mors Janua Vitæ."

BEAUDOIN. Exhibited in Musée Galliera, 1903.

BECKER. Exhibited hat-pins in Musée Galliera, 1903.

BEETZ, FRAU E., Brussels. Combs with delicate and sketchy reliefs.

BEHAM, HANS. Plaque in the Musée Cluny signed H. S. B. 1545; probably a copy. Also made female figure in National Museum, Nuremberg.

BEHL, F.G., of Nuremberg.

BELLETESTE, JEAN ANTOINE. Born in 1731; died in 1811. The most celebrated master of the Dieppe school of ivory workers. Settled in Paris. Copied in ivory the sculpture of the seasons at Brussels, and executed while in Rome a group of Venus and Cupid, formerly in Hirth Collection, Munich.

BELLETESTE, LOUIS. Sculptor. Born 1757; died in 1819. Executed in 1810 the model of a ship in ivory which he brought to Napoleon at Fontainebleau.

BELLETESTE, LOUIS CHARLES ANTOINE. Born in 1787; died in 1832. Directed an atelier of ivory carvers in Paris. Executed figures in high relief and toilette objects.

BELVILLE, J. Ivory carver of Dieppe school, beginning of eighteenth century. Made a Descent from the Cross now at Vire, dept. Calvados, France.

BENDEL, JOACHIM IGNAZ. Died about 1730. Descended from a Bohemian family of artists. Resided in Prague, and in Vienna from 1699. Reliefs in the Kunsthistorische Sammlung in Vienna; mythological subjects.

BENDEL, PAULUS. Possibly related to the above-named artist. Was in Rome in 1687; also resided in Vienna. Made a figure of a wrestler after the antique.

BENDEL (BENDL), BERNHARDT. Born in 1668; died in 1736. Settled in Augsburg in 1687, after residing for some time in Rome and Paris. Carved a crucifix which is in the Frauenkirche in Munich.

BENET, EUGÈNE PAUL. Born at Dieppe. Exhibited in Salon of 1901 "Jésus devant les docteurs," statuette of silver and ivory.

BERG, MAGNUS. Born at Hedemarken, Norway, November 28, 1666; died at Copenhagen, March 31, 1739. Began as a painter, then took up ivory carving. One of the principal carvers of the Baroque period. Executed pictorial representations of biblical and mythological scenes and a large allegorical composition in honor of Frederick IV which was completed in 1730.

BERGMAN, JOHANN. Sculptor. Born at Reichenberg, Bohemia, in the eighteenth century. Worked at Brünn, Moravia, from 1763 to 1781. Executed numerous portraits in ivory and in alabaster.

BEURDEN, ALPHONSE VAN. Sculptor and ivory carver. Born in Antwerp, April 23, 1854.

BEURDEN (BEVEREN), MATHIEU VAN. Born in Antwerp in 1630; died in Brussels in 1680. Carver of crucifixes in Antwerp in 1670. Pupil of Peter Vanbruggen, the Elder. Admitted to the guild of sculptors in 1650.

BICKEL. Exhibited medallion, child's head in Musée Galliera, 1903.

BIENAYMÉ FAMILY. Ivory carvers of the Dieppe school in the eighteenth century.

BIGNARD, FRANÇOIS AUGUSTE. Born in 1816; died in 1876. Of Dieppe school. Head of a woman done in ivory in Musée Galliera, 1903.

BIGNAN, of Dieppe school.

BIGOT. Exhibited in Musée Galliera, 1903.

BLARD, THE ELDER. Of the Dieppe school. "Deposition from the Cross"; various low reliefs on mosaic background. Eighteenth century.

BLARD (THEODORE?), THE YOUNGER. Pupil of David d'Angers. Of the Dieppe school; nineteenth century. Exhibited in Salon of 1842; and in Salon of 1857 a Christ in ivory.

BLOND, CHARLES. Of Dieppe school; active toward 1686. The dial of a compass by him is in the Dieppe Museum.

BONCQUET, HENRI. Exhibited a "Calvaire" in Salon of 1899.

BONZANIGO, GIUSEPPE MARIA. Born at Bellinzona in 1744; died in Turin in 1820. Left many pupils.

- BOSSALT, RUDOLF.** Born at Perleberg, Brandenburg, in 1871. Combs of original design.
- BOSSUTT, FRANCIS VAN.** Born in Brussels in 1635; died in Amsterdam, September 22, 1692. Resided many years in Italy. A number of his works are figured in Beddsnyder's *Kunstkammer*, 1727. A French inscription on his grave may be rendered: "His chisel gave life to marble and breath to ivory."
- BOURCHARDON, ———.** Born in 1698; died in 1762. Crucifix in St. Sulpice, Paris.
- BOURGOIN, EUGÈNE.** Crucifix in Salon, 1902.
- BOUTELLIER, PHILIPPE SAMSON.** Born in Dieppe in 1767; died in Rouen in 1812.
- BOUVAL.** Born in Toulouse. Pupil of Falguière. Exhibited in Salon, 1907, "Rêverie d'Antonne," bronze and ivory statuette.
- BOY, FERDINAND.** Born at Russ, Prussian Lithuania; died in Berlin in 1880. Sculptor. Bust of G. Schadow in the Herzogl. Museum, Brunswick. Also executed a costly casket for Queen Elizabeth of Prussia.
- BRAECKE, PIERRE.** Sculptor. Born at Nieuport, West Flanders, in 1859. Exhibited in Brussels Exposition, 1897.
- BRASDEFER, GUILLAUME.** Died in Dieppe in 1676.
- BRAUN, CHRISTIAN,** of Ulm, Germany. An *Ecce Homo* in the Louvre.
- BRISEVIN.** Pupil of Auguste Moreau-Vauthier.
- BRODBECK, ADOLPHE.** Of Dieppe school end of seventeenth and beginning of eighteenth century. In the Dieppe Museum a work of his called the "Gate of Nantes" may be seen.
- BROU, FREDERIC.** Born in Mauritius. Pupil of Larroux. "Petite Hollandaise," statuette bronze and ivory.
- BRUNEL, LOUIS RAYMOND.** Born at Dieppe in 1818; died in 1882. Of the Dieppe school; Christs and statuettes.
- BUISSON,** of the Dieppe school. Eighteenth century. Many pupils.
- BURGER-HARTMANN, SOPHIE.** Born in Munich in 1868; wife of the portrait painter, Fritz Burger. Exhibited in Paris Exposition of 1900.
- BURRER, GEORG.** Flourished in Stuttgart in the first third of the seventeenth century. Finely carved pokal in the Vienna Hofmuseum executed in 1616.
- CANAPUTILLE.** Exhibited in Musée Galliera, 1903.
- CANAVERI,** of Bonzanigo's school.
- CAPUZ, RAYMUNDO.** Sculptor 1665-1743. Statuettes of Spanish beggars, modelled after the life in Madrid. Court sculptor to the Prince of Asturias of the time.
- CARPENTIER,** of the Dieppe school; nineteenth century.
- CARON, ALEXANDRE AUGUSTE.** Born in Paris. Pupil of Barrau and Scaillet. Exhibited in Salon, 1900, "Esclave à vendre," statuette of ivory, gold, enamel, and precious stones; in Salon of 1901, "Sortie de bain," group in ivory, gold, silver, enamel, and precious stones; in Salon, 1902, "Du haut de l'Olympe," statuette in ivory, gold, and precious stones and "Charmeuse," statuette of ivory and precious materials; in Salon, 1903, "Jean," bust in ivory; in Salon, 1906, "Désillusion," statuette of ivory; in Salon, 1907, "Atalante," statuette of ivory, and "Sans-gene," ivory bust; in Salon, 1908, "Frisson d'Avril," ivory statuette; in Salon, 1909, "Surprise," statuette in ivory and precious stones.
- CARACCI, AGOSTINO.** Born in 1557; died in 1605. Satyr and nymphs in Correr Museum, Venice.
- CAVALIER, JEAN.** Medallion portraits of royal and noble personages. Executed many works from 1680 to 1707 in Berlin, Cassel, Vienna, Brunswick, and Stockholm.
- CHARLIER G.** Belgium. Exhibited in Brussels Exposition "Water-carriers of Palermo."
- CHAVANNES, NINETTE,** née Perdriollet. Painter on ivory. Born at Lyons, September 18, 1859. Exhibited at Geneva Exposition of 1896. Resides in Lausanne.
- CHEVALIER, NICOLAS.** Sixteenth century.
- CLÉMENCE.** Exhibited in Musée Galliera, 1903.
- CLERGET, ALEXANDRE.** Pupil of Falguière and Rambaud. Exhibited in Salon, 1907, "La dame à l'écharpe," statuette of ivory and gilded bronze.
- COINTRE,** of Dieppe school. Eighteenth century. Figures of mendicants.
- COLETTE, CHARLES TRANQUILLE.** Born in Dieppe in 1824; died in 1895. Pupil of d'Ouvrier; worked in Paris and Hamburg (with Hampendel). "The Rape of the Sabines," in the Dieppe

- Museum; "Eve plucking the apple," and "La Danse."
- COLOMBO(?), AMBROISE. Sculptor. Italian of the nineteenth century. Exhibited in Milan, Turin, and Venice between 1870 and 1887.
- COMEIN. Exhibited in Brussels Exposition, "Flemish Milkmaid."
- COPÉ, GIOVANNI, surnamed "IL FLAMMINGO," "Four Seasons," signed; also plaque in Wallace collection.
- CORNU, JEAN. Died in 1710. Of Dieppe school. No work of his is certainly known.
- COSYNS, J. Probably identical with Henri Cosyns, an Antwerp sculptor, long active in London, and who died in 1700. Reliefs in Bavarian National Museum; figures of children.
- COUILLY, JEHAN DE. Ivory carver of the fourteenth century. Worked for Philippe le Hardi, Duke of Burgundy (1367-1387).
- CRACO. Belgium. Exhibited in Brussels Exposition.
- CROQUELOI. "Deposition from the Cross"; low reliefs on mosaic groundwork.
- CRUPPERVOLLE (or CRUCVOLLE?), THE ELDER. Born at Dieppe in 1680; died in 1740.
- CRUPPERVOLLE, THE YOUNGER. Born at Dieppe in 1726; died in 1806.
- DÄBELER (DÖBELER), MICHAEL. Born in 1635; died in 1702. At the court of Elector Frederick William of Brunswick. Cane-handle, with artistic grouping of six children, in the Kunstgewerbe Museum, Berlin. This oft-repeated design probably originated with Däbeler.
- DAMPT, JEAN. Exhibited in Salon, 1894, group "Knight Raymondin and Mélusine," of ivory and steel and in Musée Galliera, 1903, "Paix au Foyer" in wood and ivory.
- DÉAN, ———. Bust of Christ in Musée Galliera, 1903.
- DELACOUR, CLOVIS. Born at Châtillon-sur-Seine. Pupil of Gérôme. Statuette of "Phoebe," Salon, 1902; "Andromache," Royal Academy, 1901; "Le Réveil," Salon, 1905; "Elaine" in Musée Galliera, 1903.
- DELAHAYES, ———, of Dieppe school. Nineteenth century.
- DELAHERCHE, ———. Relief after Botticelli, ivory patiné, in Musée Galliera, 1903.
- DESCOMPS, JOÉ. Born at Clermont-Ferrand. Exhibited in Salon, 1904, "Nonia au bain," statuette of ivory and precious stones; Salon, 1907, group "Lygie," ivory and marble; "Le Silence," in Musée Galliera, 1903.
- DESPOILLY, ———, of Dieppe school. Nineteenth century.
- DESRIEUX, ———. Worked in Paris first half of nineteenth century. Executed many medallions.
- DEVARENNES, ANATOLE. "Vierge" in Musée Galliera, 1903.
- DEVARENNES, EDOUARD. Exhibited in Musée Galliera, 1903.
- DISSL, ———, of Munich. Jewel caskets.
- DILLENS, J. Exhibited in Brussels Exposition "Genius with lily."
- DIPENUS and SKYLLIS of Crete. Probably pupils of Dædalus. About middle of sixth century B. C. Statues of Castor and Pollux, of wood and ivory, in their temple at Argos.
- DOBBERMANN, JACOB. Born in 1682; died in 1745. Was in the service of Landgrave Karl of Hesse-Cassel from 1716. At first only carved amber; later exclusively ivory. Biblical and mythological subjects. Finest work medallion portraits of Landgrave Karl and his wife, in the Picture Gallery, Cassel.
- DONATELLO FIORENTINO. Seventeenth century. Graceful figure of a nude woman; mentioned by Jacquemart.
- DOUHOULT-WIELAND. Jeweller of Paris beginning of nineteenth century. Small ivory busts.
- DOURNÈS, ———, of Toulouse. Imitations of the carvings of earlier epochs.
- DUBOIS, F. Exhibited in Brussels Exposition. Fans, caskets, etc.
- DÜRER, ALBRECHT. Born at Nuremberg, in 1471, died there April 6, 1528. Several works bearing his monogram have been incorrectly attributed to his hand, but were executed at a later period after his designs.
- DUPON, J. Exhibited in Brussels Exposition statuette, "Diana."
- DUQUESNOY, FRANÇOIS. Sculptor. Born in Brussels in 1594; died at Livorno July 12, 1646. Studied antique models and the Venetian school of painting. Statuette of St. Sebastian. A crucifix given by him to Pope Urban VIII is a masterpiece in this style. Also celebrated for studies of child life; the

- famous Manneken Pis of Brussels is attributed to him.
DUQUESNOY, JÉRÔME. Made crucifixes.
- EBELL, ———.** Works exhibited in Kunstgewerbe Museum, Berlin, in 1894. Statuettes.
- EBENHECH (EBENHOCH), GEORG FRANZ** of Leipzig. Two reliefs in the City Library, Leipzig; a flute-playing faun, and a Venus and Cupid. Settled in Potsdam, where he died in 1757.
- EICHLER, JOSEPH IGNAZ.** Born in Rome in 1714; resided in Brunswick and Wolfenbüttel; died in 1763. Reliefs, "The Seasons," "St. Jerome," etc. Works in Ducal Museum, Brunswick.
- EISENBERG, JOHANN.** Of Coburg. Two pokals in the Vienna Collection, executed respectively in 1630 and 1632. Sometimes worked with Heiden.
- ELHAFEN, IGNAZ.** Born about the middle of the seventeenth century, probably in Nuremberg. Studied in Rome; settled in Vienna and then in Düsseldorf. Largest collection of his works is in Bavarian National Museum, Munich. Statuettes of Venus and Bacchus, etc.
- ENFANS, A. DE.** Exhibited in Brussels Exposition, "Christ bound to a Pillar," "Mary in Prayer."
- ERHARD, ———,** of Munich.
- ERTEL, ———,** of Zittau.
- EUDES, ———.** Bataille d'Arbèles in Musée Galliera, 1903.
- FAID'HERBE (FAYD'HERBE), LUCAS.** Baptised in Mechlin, January 12, 1617; died there December 31, 1697. Pupil of Rubens; executed a number of ivory carvings after designs by his master. A tankard in the Grossherzogliches Museum in Karlsruhe is probably by him. Relief in Prado Museum, Madrid, children dancing.
- FAISTENBERG, ANDREAS.** Born in 1646 (?) in the Tyrol; came to Munich in 1674; died there as electoral court sculptor in 1735. Crucifixes, especially one exhibited in Tours in 1887, dated 1681, nearly 30 in. in height and of an exceptionally fine piece of ivory; the eyes of the Christ are painted blue, the blood drops red, and there are traces of gold paint.
- FALGUIÈRE, J. A. J.** Born 1831; died 1900. Comb in Musée Galliera, 1903.
- FALTZ, RAIMUND.** Born in Sweden. Came to Berlin in 1688; died there in 1703. Medallist. He appears to have occasionally executed ivory carvings.
- FÈS, L. DE.** Exhibited in Salon, 1911, three medallion portraits.
- FERBECQ, ———,** of Frankfort.
- FERRARY, ———.** Exhibited in Salon, 1898, "Leda and Swan," and a St. George in ivory and bronze.
- FIAMMINGO, GIACOMO.** Was in Rome in 1595.
- FIAMMINGO, GIOVANNI.** Probably either a relative of François Duquesnoy, or identical with him. A Fleming.
- FISCHER, E.,** of Munich. Charming rococo brooches.
- FISHER, ALEXANDER.** Caskets; tankards.
- FLAMMAND, ———,** of Dieppe school. Eighteenth century.
- FONTAINE, EMMANUEL.** Born at Abbeville. Exhibited in Salon, 1907, statuette, "Premier Frisson," ivory and silver gilt.
- FOZ, RENÉ.** "Japanese Girl" in Salon, 1898.
- FRAMERY, HECTOR.** Exhibited brushes in Musée Galliera, 1903.
- FRAMPTON, GEORGE.** A "St. George" in bronze, agate, and mother-of-pearl, and a "Lamia," head-dress adorned with pearls.
- FRANCELLI, FRANCESCO.** In Rome and later at the English Court. No work of his preserved.
- FRÄNZEL, WILHELM.** Born in Vienna in 1826. Studied under Kähseman. Busts of Radetzky, Francis Joseph, Empress Elizabeth, etc.
- FRESE (FREESE, VRESE, FRIESE), THEOPHILUS WILHELM.** Sculptor. Born in Bremen, middle of eighteenth century; died there in 1763. Statuette of St. Jerome in Kunstgewerbe-Museum, Berlin.
- FREUDENBERGER, ———,** of Erbach school (c. 1850). Lamps, inkstands, umbrella handles, fans, etc.
- FROMENT, MEURICE.** The most celebrated representative of the goldsmith's art in Paris in his time. Died in 1855. "Toilet of Venus" of ivory and silver.
- GARDET, ———.** "Le Lion Amoureux" in Musée Galliera, 1903.
- GELEYN, J.** Exhibited in Brussels Exposition, 1897, a "Fury."
- GERBER, J.** Latter half of nineteenth century. Berlin.

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GÉRÔME, JEAN LÉON. Painter and sculptor. Born May 11, 1824, at Vesoul (dept. Saône sup.); died in Paris, January 9, 1904. Life-size "Bellona" of ivory and bronze in Royal Academy, 1893.

GEUNS, PIERRE. Born in Maeseyck, Holland, in 1706; died in 1776. Made snuff boxes and other small objects.

GEYGER, ERNST MORITZ. Painter and sculptor. Born in Ritdorf, November 6, 1861. "The Campagnestier" in Paris Exposition, 1900, of ivory and marble.

GILLES, PAUL. Born in Paris. Salon, 1905, "Le Réveil," statuette. Salon, 1909, two statuettes. Statuette and pendants in Musée Galliéra, 1903.

GIOVANNI DI BOLOGNA. Fifteenth to sixteenth century. Statuette of Hercules.

GIRARDON, FRANÇOIS. A crucifix is attributed to him.

GLENZ, O. The most noted of the Erbach carvers at the present day.

GÖRING, ———, of the Erbach school.

GÖRLITZER, ———. Middle of seventeenth century, Nuremberg. Cups, spinning wheels, etc.

GONTIER. Exhibited in Musée Galliéra, 1903, umbrella handles, etc.

GORNAES, JOERGEN CHRISTIANSEN. Statuette of a grayhound in Herzogliches Museum at Brunswick.

GOUJON, JEAN. Called the French Phidias. Born about 1515; died (probably at Bologna) in 1564 or 1565. Some ivory work is rather doubtfully attributed to his hand, as, for instance, a crucifix and a powder flask in the Louvre.

GRAILLON, THE ELDER. Groups of mendicants, of sailors, in Musée Galliéra, 1903.

GRAILLON, CÉSAR. "Ecce Homo" in Musée Galliéra, 1903.

GRAILLON, FELIX. "Virgin and Child," "L'Enfant et la Fortune" (relief), "Adam and Eve," in Musée Galliéra, 1903.

GRAFF, AXEL. "Le Chat" in Musée Galliéra, 1903.

GREENWOOD, ISAAC. American ivory turner, end of eighteenth century.

GRISSARD, HENRI DÉSIRÉ. Born in Paris. Exhibited in Salon, 1907, bronze and ivory statuette, "Pâques Fleuries."

GRÜN, G. Nuremberg. Died after 1620.

GUALTERIO, GIOVANNI ANTONIO. Of Gaeta. Nothing known of his work. See A. Bertolotti, "Artisti belgi ed olandesi a Roma nei secoli 16 e 17," p. 234.

GUILLAUME, ÉMILE. Born in Paris. Exhibited statuettes in Musée Galliéra, 1903, and in the Salon of 1905. Statuette portrait of Mme. Jane Catulle Mendès; bronze and ivory.

GUILLERMIN, JEAN BAPTISTE. Born in 1643 (?); died in 1699. Crucifix by him in Musée Calvet at Avignon, dated 1659. Said to have been from Lyons; lived in Avignon and Paris, where he died. Canova praised this crucifix highly, asserting that one equally good would never be made.

GUILLOUX, ALBERT GASTON. Born in Rouen. Exhibited in Salon of 1904, casket in fifteenth-century style in wood, inlaid with ivory.

HABERG (HABUT), VINCENZ GEORG. Died in 1746. Mythological and allegorical carvings in the Herzogliches Museum at Brunswick; of little merit.

HAENIQUE, ———, of Dieppe school.

HAGAR, C. Brussels, eighteenth century. Fine diminutive carvings; microtechnique.

HALM, JOHANN MICHAEL. Regensburg, Bavaria. Eighteenth century. Pupil of Teuber.

HALM, ADAM, of Schweinfurt.

HALM, CONRAD, of Schweinfurt.

HAMMAUX, EMANUEL. Born in Metz. Pupil of Dimont. Exhibited in Salon, 1908, a helmeted head in marble and ivory.

HAMMER, MICHAEL. Born 1750; died beginning of nineteenth century. Nuremberg. Medallions for rings and bracelets.

HARRICH, CHRISTOPH. Died 1730. Nuremberg. Wonderfully executed death's heads.

HARSDÖRFFER, ———. Amateur carver. A Ratsherr or Councillor of Nuremberg.

HARTMANN, F. Died in 1898. Of Erbach school. Executed a fine hunting-cup.

HARTMANN, M. of Munich. Nineteenth century.

HAUTSCHER, of Nuremberg, beginning of eighteenth century. This carver was so marvellously skilful in microtechnique that he is said to have been able to put one hundred of his diminutive cups into a peppercorn.

- HEERMANN, PAUL.** Sculptor. Born in 1673; died in 1732. Flourished in Leipzig and Dresden. No certain works.
- HEIDEN (HEYDE), MARCUS.** Of Coburg. Called in 1638 to Weimar by Duke Wilhelm IV (d. 1662). Turnery cups.
- HENKE, PETER.** Worked for Duke August Wilhelm of Brunswick (1714-1731). Relief of Assumption of Virgin Mary in a private collection.
- HENNEGUY, "L'Amour Aveugle,"** in Musée Galliera, 1903.
- HENNEN, JOACHIM.** Seventeenth century. Portrait in relief of a man, dated 1633, in Königliches Museum, Berlin.
- HEPP, ESAIS.** In the service of the Elector of Brandenburg from 1660, as worker in tortoise-shell, ivory, silver, etc.
- HERRLINGER, EDWARD.** Of Dresden.
- HERZ, BENEDICT.** Died in Nuremberg in 1635. Crucifixes and figures.
- HESCHLER, DAVID.** Second half of seventeenth century in Ulm. Group of Hercules and Antæus in Cassel Museum signed D H B 1635 may be by him.
- HESIN, ———.** Lute dated 1886 in Exhibition of Musical Instruments in London in 1885.
- HESS, PAUL.** Of Bamberg; resided long in Brussels and then settled in Vienna in 1780; died there in 1798. Bracelets, rings, and box covers with landscape designs. He usually worked with a magnifying glass, the little trees and figures being sometimes glued upon the background, which has a light blue tint.
- HESS, SEBASTIAN,** of Vienna. Work similar to that of Paul Hess.
- HEU, ———,** of Dieppe school, eighteenth to nineteenth century.
- HIRSCHWALD, ———,** of Munich. Statuettes, amorettes, ladies and gentlemen in Rococo costume.
- HOCHECKER, SERVATIUS,** of Frankfort; eighteenth century.
- HOOKE, SAMUEL R.** B. 1835; d. 1896.
- HOOKE, GEORGE F.,** son of above. B. 1879.
- HOLLÄNDER, JAN.** Seventeenth century. Cup with bacchanalian design in the Rosenborg Collection, Copenhagen.
- HOLZSCHUER, G.** Amateur of Nuremberg. Ratsherr (Councillor).
- HOSEMANS, F.** Of Brussels. Fine fans and lamps; two specimens in the Königl. Kunstgewerbe Museum in Berlin, after models by Rombaux; of ivory, combined with silver gilt and yellow onyx.
- HORNUNG.** Born in Suabian Hall in the seventeenth century. Noted for his cups carved with hunting or battle scenes; there is also a gun carved with hunting and mythological designs in the Ambraser Collection.
- HUBER, ———,** of Vienna.
- HUGGENBUG, SEBASTIAN.** Sculptor and medallist of Brunswick; end of seventeenth century. Crucifix in Johannis-kirche in Wolfenbüttel.
- HURDTER, JOHANN ULRICH.** From Switzerland. Pupil of Heschler in Ulm. Settled there, where he was still living in 1675. Reliefs and tankards. No certain work of his now known.
- JAILLOT, HUBERT.** Of St. Claude (dept. Jura).
- JAILLOT, SIMON.** Elder brother of Hubert JailLOT. Died in 1681. Crucifix in the Hôpital de St. Germain des Près, Paris. Was received into the Academy as a "sculptor of ivory crucifixes," a proof how highly this branch of art was then esteemed.
- JANVIER.** Exhibited group, "Bear and Rabbits," in Musée Galliera, 1903.
- JESPERS, E.,** of Belgium. Exhibited in Brussels Exposition of 1897, "Love disarmed by Psyche."
- JOEL SR.** Exhibited in Musée Galliera, 1903.
- JOEL, ALFRED.** Born in Paris. Pupil of Carlus. Exhibited in Salon, 1908, "Le Retour," statuette of mahogany and ivory.
- JORHAN, CHRISTIAN, THE ELDER.** Sculptor. Born at Griesbach in Lower Bavaria in 1733; died at Landhut, Bavaria, in 1807. Studied at the Augsburg Academy and with Straub.
- JULIEN, Paul.** A Christ in Musée Galliera, 1903.
- KALAMIS.** Made ivory and gold statue of Asklepios in Sikyon.
- KALDENBERG, FRITZ J. B.** New York, 1855. Executed in 1896 for Li Hung Chang a combination group, Li Hung Chang, Bismarck and Gladstone. Busts of Rembrandt, and U. S. Grant, and a bust of Mignon.
- KALLICRATES.** Sculptor, and ivory and metal worker of Lacedæmon. Executed microscopically small objects, tradition telling of a quadriga that

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- could be covered with a fly's wing, and of a ship that could be placed beneath the wing of a bee.
- KANACHUS.** Made ivory and gold statue in Sikyon.
- KAUZMANN.** Brothers of that name from Geislingen. Pokal of ivory and gold after design by H. Peter is figured in *Sächsische Gewerbezeitung*, 1893, p. 16.
- KEHRER, E.,** of Erbach school. Eighteenth century.
- KERN, LEONHARD.** Born in 1588; died in 1663. Of German birth. Resided in Italy.
- KHALAF.** Moorish ivory carver of the first half of the eleventh century. Executed a beautiful coffret, now owned by Mr. John Malcolm of Pottallock.
- KIRCH, FREUMUND.** Worked in Vienna about the middle of the seventeenth century; made spinning wheels, cups, etc.
- KIRCHNER, JOHANN WILHELM.** Lived in Cassel in the last third of the eighteenth century; official coin engraver. Executed in ivory medallion portraits of Landgrave Frederick II and his wife; also anatomical studies of a man and a woman.
- KLAMMER, NIKOLAUS.** Born in Vienna in 1769; died in Graz, March 25, 1830. Lived in Vienna until 1797, when he settled in Graz. Developed micro-technique to a wonderful degree. Landscapes with trees, flowers, etc., the details being so fine as to be sometimes only recognizable through a magnifying glass.
- KLEINERT, FREDERICK.** Died in 1714. Of Nuremberg.
- KLESECKER (GLESSCKHER), JUSTUS.** Born in Hamelin; died in Frankfort where he had worked in 1653-54. Travelled in the Netherlands and to Rome. Executed crucifixes, etc.
- KNOLL, BEUNONI.** Died in 1764. Made a large carving in ivory representing the Passion of Our Lord.
- KNOLL, MICHAEL,** of Geislingen, where he was living about 1780. Regarded as the most distinguished ivory carver there. Son of Beunoni Knoll.
- KOHLER, JOHANN CHRISTOPH.** A court jeweller of Augustus the Strong. Lived in Dresden. Statuettes in gold, ivory, and enamel. In the Grüne Gewölbe are figures of a cobbler, a potter, a knife grinder, etc.; also a lace maker, known as Barbara Uttmann.
- KOLOPES.** Made ivory table at Olympia.
- KRABENBERGER, ———,** of Nymphenberg, Bavaria. Pupil of Troger.
- KREBAR, GIOVANNI,** of Padua. Lute. Dated 1629.
- KRÜGER, Wilhelm,** of Dantzig. Active after 1711 in Dresden. Four statuettes, the so-called, "Beggars of Countess Königsmark," in the Grüne Gewölbe, Dresden; there is also there a pokal with relief of Diana hunting.
- KRÜGER, GOTTLIEB WILHELM.** Carver of amber and ivory. Dresden. Son of Wilhelm Krüger.
- LACROIX, C.** A Burgundian; worked for a long time in Genoa. Seventeenth century. Crucifixes. No certain work since the disappearance of the crucifix on the high altar of Sta. Annunziata, Genoa. Specimen of his work said to have been shown in Paris Exposition, 1867; see *Gazette des Beaux Arts*, Vol. XIX, p. 343.
- LAGAE, JULIUS.** Born in Brussels in 1865. Pupil of J. Lambeaux of Brussels. Exhibited in Brussels Exposition.
- LAFLEUR, ABEL.** Born at Rodez, dept. Aveyron, France. Exhibited in Panama-Pacific International Exposition, San Francisco, 1915.
- LALIQUE, RENÉ.** The most celebrated of the ornament workers in Paris; ivory used principally for female heads or for bodies.
- LANCETTI, LANCIOTTO.** Born in Perugia in 1861; nephew of Federigo Lancetti. Studied at Academy of Perugia and became professor there.
- LANKHORST, ———.** Ivory carver and silversmith in Amsterdam.
- LEBORGNE, ———.** Exhibited in Musée Galliéra, 1903.
- LEBRAELLIER, JEAN.** His name is given as that of an ivory carver in the inventory of Charles V of France; last half of fourteenth century.
- LEFÉBURE, J. B.,** of Dieppe school; eighteenth century. Christ in Musée Galliéra, 1903.
- LEFEVRE (LEFEVER), C.** Exhibited in Brussels Exposition.
- LEGERET (LE GERET), JEAN.** Sculptor. Born in 1628; died in 1688. Was in Paris in 1683. Crucifixes.
- LEGRAIN, C.** Three Christs in Musée Galliéra, 1903.

- LEGRAIN, H.** "L'Aurore" in Musée Galliera, 1903.
- LEGRAND, ———**. Medallion of Shakespeare, in Musée Galliera, 1903.
- LELONZ, R.** Chessmen in Musée Galliera, 1903.
- LEMASLE, ———**. Statuettes of Four Seasons in Musée Galliera, 1903.
- LENZ, ———**, of Geislingen.
- LÉONARD, A.** Exhibited "Danseuse" in Musée Galliera, 1903, and in Salon, 1912, "Hebe," statuette.
- LEONI, ANTONIO**, of Venice. Celebrated ivory carver; worked at court of Johann Wilhelm of the Palatinate (1690-1716). Three of his works in Bavarian National Museum; two representing bacchanalian scenes.
- LEPELTIER, ———**. Statuette in Musée Galliera, 1903.
- LEVASSEUR, HENRI LOUIS**. Born in Paris. Pupil of Dumont. Exhibited in Salon, 1908, "Phryne" statuette, and in Salon, 1909, "La naissance du chevreau."
- LEWIN-FUNKE, ARTHUR**. Sculptor. Born in Dresden, November 9, 1866. Half nude female figure, body of ivory, hair slightly toned, garment of transparent greenish onyx.
- LEYGEBE, GOTTFRIED**. Born at Freystadt in Silesia in 1630; died in 1683 in Berlin, where he had lived since 1668. Mirror frames in Kunstgewerbe Museum, Berlin, attributed to him.
- LINKE, E.** Statuettes. Ladies and gentlemen in Rococo costume, etc.
- LOBENICK (LOBENICK), EGIDIUS**, of Cologne. Was at the court of Augustus Elector of Saxony (1553-1586); from 1584 as court carver. Cups, pokals; some in Grüne Gewölbe, which, in all, has about forty specimens of his art, including a statuette of Marcus Curtius. He died before 1595.
- LOISEAU-ROUSSEAU, PAUL LOUIS ÉMILE**. Born in Paris. Pupil of Théophile Barrau. Exhibited in Salon, 1907, "Pénitente," statuette of ivory and bronze gilt.
- LORENZO DA PAVIA**. Plaque with monogram; probably copy. Worked for Isabella d'Este, especially in the inlaying of musical instruments.
- LÜCKE, CARL AUGUST, THE ELDER**. Born about 1668; died about 1730. Medallion of Duke Christian Ludwig (d. 1622) executed in 1688, is in the Grossherzogl. Museum at Schwerin. A knife grinder in the Museum at Gotha. Father of C. A. Lücke, the Younger.
- LÜCKE, CARL AUGUST, THE YOUNGER**. Born in Dresden about 1710. Resided in Schwerin and Wolfenbüttel; went to Russia in 1759; died after 1777, probably in Danzig. Bust of a beardless man in Königliches Museum, Berlin; also works in Schwerin Museum.
- LÜCKE, JOHANN CHRISTIAN LUDWIG (VON)**. Born about 1703, probably in Dresden. For a time engaged in porcelain manufacture at Meissen. In Grüne Gewölbe a crucifix 86 cm. high made from a single piece of ivory, with the exception of the arms of the cross (1737); also a group, "Reawakening of the Arts" (1736). Son of Carl August Lücke, the Elder.
- MADRASSI, LUCA**. "La Reconnaissance," ivory face, bust, and arms, in Musée Galliera, 1903; also "Théodora."
- MALAUZE, ———**. "Amphitrite," in Musée Galliera, 1903.
- MANSEL, J.** Probably a Fleming. Worked in the style of Fiammingo. Relief, children's bacchanalia, in Bavarian National Museum; for furniture inlay or mural decoration.
- MARCHAND, DAVID LE**. Died in 1726. Of the Dieppe school; principally active in England. Medallion portraits in the Herzogl. Museum, Brunswick. Busts of Lord Somers and Isaac Newton.
- MARCHINO, THE YOUNGER**. Nineteenth century.
- MARS-VALLET**. Exhibited "Philosophy" in Musée Galliera, 1903.
- MASCAUX, ———**. Exhibited figure of a stag on a jasper base in Musée Galliera, 1903.
- MATHELIN, M. DE**. Exhibited "Spring Dream" in Brussels Exposition, 1897.
- MAUCHER, CHRISTOPH**. Probably born in South Germany or Austria. Executed in Danzig, in 1700, an elaborate allegorical group, symbolizing the victory of Emperor Leopold and his son Joseph over the Turks and the Hungarian rebels; in the Kunsthistorisches Museum, Vienna.
- MAX, EMANUEL**, Elector of Bavaria, 1651. Chandelier and two candelabra; casts in the South Kensington Museum.

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- MEISSNER, ANDREAS** (OF JOHANN HEINRICH). In Danzig in the middle of the eighteenth century. Wood, ivory, and amber carvings.
- MENA Y MEDRANO, PEDRO DE.** Sculptor. Of Aosta. Died in 1693 in Malaga. Probably executed a statue of St. Francis in the Cathedral of Toledo, composed of ivory and other materials. Pupil of his father and of Cano in Granada.
- MERCIER, ———.** Exhibited in Musée Galliera, 1903.
- MÈRE, CLÉMENT,** of Paris.
- MEUGNOT, ———,** of Dieppe school. Nineteenth century.
- MEUNIER, CONSTANTIN.** Born in Merch-lès-Brussel. Exhibited in Brussels Exposition, 1897.
- MEYENSCHEN, ———,** of Erbach school. Nineteenth century.
- MICHELANGELO BUONAROTTI.** Born at Castel Caprese near Arezzo, March 6, 1475; died in Rome, February 17, 1564. Several pieces of ivory carving are attributed to him, probably erroneously; as, for instance, a "Deposition from the Cross" in the National Museum, Florence.
- MICHELET, FURMIN MARCELIN.** Exhibited in Salon, 1908, portrait statuette of Mme. J. D., done in marble and ivory.
- MIDDEGAËLS,** exhibited in Musée Galliera, 1903.
- MIKI, M.,** New York, 1875. Formerly of Japan.
- MIGLIARA,** Italian of eighteenth or nineteenth century.
- MILLET, JEAN.** Flourished last half of seventeenth century.
- MOGI, Y.,** 1877, New York. Formerly of Japan.
- MOLARD (MOLLARD), MICHEL.** Ivory carver and metal worker of the seventeenth century. Flourished under Louis XIV.
- MOREAU-VAUTHIER.** Born in Paris in 1832; died there in 1893. Exhibited in the Salon of 1881, a chryselephantine statuette "Fortuna"; in 1885, a similar work, "Painting"; in 1889, a bust from an exceptionally large elephant tusk, and provided with a gilded cuirass and helmet by Falize; in 1903, at the Musée Galliera, "Jeanne d'Arc au bûcher," also many other works in the Walters Collection.
- MYS.** Greek ivory worker, who executed the high reliefs on the shield of the Pallas Athena of Phidias, from designs by Parrhesios.
- NAHALI, YUSUF AL.** Arabian carver. Made in the early part of the ninth century an elaborately carved chessman, one of a set given by Haroun al Rashid to Charlemagne.
- NAUKYDES.** Made statue of Hebe in Herseum at Argos.
- NEVIR, A.,** of Berlin. Genre figures; ladies and gentlemen in Rococo or Directoire costume, etc.
- NICOLLE, JEAN.** This name inscribed on a thirteenth-century pax in the British Museum was once believed to be that of the artist, but is now regarded as that of the owner.
- NICOLLE,** of the Dieppe school. Pupil of Blard. Statuettes and low reliefs after the antique. "Bacchus" and "Minerva" of Nicolle aîné in Musée Galliera, 1903.
- NORDMANN, JACOB JANSEN.** Of Copenhagen; died 1680. Ships' models in ivory; some in Rosenberg Collection, Copenhagen.
- NORRESSE, J.** Head of Christ, bas-relief, in Musée Galliera, 1903.
- O'KIN, MILE.,** of Paris.
- OLIVIER, MME. THÉODORE ÉMILE.** Born in Bordeaux. Exhibited in Salon, 1904, portrait bust of Mme. G.
- OPSTAL, GERHARD (VAN).** Born in Antwerp in 1595 (according to others, in Brussels in 1604); died in 1688, in Paris, where he had passed most of his life. His ivory work contributed more to his fame than his work in stone or bronze. Took Rubens as his model. Many of his carvings were bought by Louis XIV; crucifixes, low reliefs; five of the latter now in the Louvre. "Education of Bacchus" in the Musée Cluny.
- OUIN, ———,** of Dieppe school, nineteenth century.
- OUVRIER, ———,** of Dieppe school, nineteenth century.
- OVERES, A. G.** Exhibited fans, caskets, brooches, watches, etc., in Brussels Exposition, 1897.
- PÄCHTER.** Exhibited in Kunstgewerbe Museum, Berlin, 1894.

- PAULUS, MELCHIOR.** In the treasury of Cologne Cathedral are ten reliefs with scenes from the Passion of Our Lord dated 1703-1733; some other works in private collections in Cologne.
- PENDL, EMANUEL.** Sculptor. Born at Meran, February 23, 1845. Statuettes exhibited in Kunstgewerbe Museum, Berlin, 1894.
- PERMOSER, BALTHASAR.** Born at Kammer, Bavaria, August 1, 1650; died in Dresden, February 20, 1732. Several works in Grüne Gewölbe, Dresden: "Jupiter and Eagle," "Seasons," "Hercules and Omphale"; also very fine crucifixes in Jakobikirche, Freiburg, and in the Herzogl. Museum, Brunswick.
- PERSINKA, LÉON.** Born in Paris. Exhibited in Salon, 1909, statuette of St. George, bronze and ivory.
- PETEL GEORG.** Born at Welheim, Bavaria; visited Italy; finally settled in Augsburg where he worked for the Fuggers and died in 1634. Tankard in Kunsthistorisches Museum, Vienna.
- PFEIFHOFEN, ———.** Living in 1694. Bas-reliefs.
- PHIDIAS.** Born in Athens between 490 and 485 B. C. Executed the colossal gold and ivory statues of Zeus at Elis (451 B. C.) and of Athena at Athens (438 B. C.). Falsely accused of purloining some of the gold for the latter statue, he exonerated himself by having the gold adornments, weighing 44 Attic talents (about 2,500 pounds), removed and reweighed, but on a later accusation of having depicted his own features and those of Pericles on the shield of the goddess, he was again cast into prison, where he died.
- PHILLIPPE, ADRIEN.** Wristguard in Wallace Collection dated 1608.
- PHILLIPS, PAUL.** Born in Germany. Exhibited two works in bronze and ivory in Salon of 1909, "Farniente" and "Grace et Force."
- PICHLER, JOHANN.** Born in the Tyrol about 1700. Figures and groups of jugglers and mendicants.
- PISANO, GIOVANNI.** Fifteenth to sixteenth century. A madonna attributed to him.
- PISANO, NINO.** Sculptor of fourteenth century; died before 1368. Son of Andrea Pisano.
- PLANZONE, FILIPPO.** Born in Nicosia; flourished until 1636. Called Il Siciliano. Horse in a cage, the whole carved out of a single piece of ivory, in National Museum, Florence.
- POINT, AMAND.** Exhibited a triptych, "La Musique" in Musée Galliéra, 1903; ivory and enamel.
- POMPE, JOHANNES ENGELBERTUS.** Sculptor. Born in Antwerp in 1744; died there November 1, 1810. Crucifixes in ivory.
- POMPE, WALTERIUS.** Father of Johannes Engelbertus Pompe. Born in Lidt, North Brabant; died in Antwerp February 7, 1777. Celebrated for his Christs of ivory and palm-wood.
- POZZO, GIOVANNI (ANDREA).** In Rome about 1700. Medallist and ivory carver. Copied antique models. Medallion portrait dated 1717 in Kunst-kammer.
- PRADIER, JAMES (JEAN JACQUES).** Sculptor. Born in Geneva, May 23, 1792; died in Bougival, June 4, 1862. Pupil of Lemot, Gérard, École des Beaux Arts.
- PRONNER, LEOPOLD.** Born in Thalhausen, Carinthia, in 1560; died in 1630. After 1600 in Nuremberg. Diminutive objects; little equestrian figures so small that they could be passed through the eye of a needle.
- QUELLINUS, ARTHUR.** Born in Antwerp in 1609; died there August 23, 1668. The sculptor of the decorations to the Rathaus in Amsterdam. It is considered not unlikely that he executed ivory carvings.
- RASUMANY, F.** Exhibited in Salon, 1912, two plaquettes, "Leda" and "Salomé."
- RAUCHMÜLLER, MATHIAS.** Born in the Tyrol before 1660; died after 1720. Sculptor. Was in Vienna, Breslau, and the Rhine country. A large tankard with bacchanalian scenes in the collection of Prince Liechtenstein in Vienna, dated 1670. Group of Apollo and Neptune in the Kaiserliches Hof-museum, Vienna, is also probably by him.
- RAYMOND DE BROUTELLES.** Portrait in Musée Galliéra, 1903.
- RENARD.** Small vases in Musée Galliéra, 1903.
- REYT, CONRAD.** Sculptor. Of the sixteenth century. Born in Switzerland; worked in Brussels. Made copies in ivory of his

- Sybils which adorn the grave of Philibert of Savoy (1511-1536) in the church of Bourg-en-Bresse.
- RIVIÈRE-THÉODORE, LOUIS AUGUSTE.** Born in Toulouse, July 14, 1857; died 1912. "Adam and Eve," "Le Gui." In the statuette, "Salamambo," shown in Dresden Exposition, 1901, the figure is of ivory, marble, onyx, and enamel, while the head ornaments are of pearls and precious stones. In the Musée Galliera, 1903, were shown "Vierge de Sunnam," "Loie Fuller" (silver and ivory), and a portrait statuette of Mme. la Comtesse Récopé. Some of his works shown at the Panama-Pacific International Exposition, San Francisco, 1915.
- ROMBAUT, ÉGIDE GASTON.** Born in 1865. "Venusberg" in Brussels Exposition, 1897.
- ROSENSTIEL, FR.,** of Berlin.
- ROSSET, FRANÇOIS,** of Saint-Claude (dept. Jura). Son and pupil of Joseph Rosset; busts of contemporaries, crucifixes; statuette of St. Thérèse in the Louvre.
- ROSSET, JOSEPH.** Born in Saint-Claude (dept. Jura) in 1706; died there in 1786. Attracted the attention of Frederick the Great and of Voltaire; many crucifixes.
- ROUSSEL, ———,** of Paris. Executed five angels' heads in African ivory for the seat of Klinger's Beethoven statue after designs by that sculptor.
- ROUTE, GILBERT GASPARD.** Eighteenth century. In 1751 he was elected member of the Academy because of a crucifix he had made.
- ROY, H. LE.** "Girl with Kid" in Brussels Exposition, 1897.
- ROZET and FISCHMEISTER** of Vienna. Pendants with ivory figures after designs by Fräulein Schreder.
- RUDDER, ISIDOR.** Sculptor. Born in 1855. Exhibited in Antwerp Exposition in 1894.
- RUDOLPH, B.,** of Stuttgart.
- SAC-EPÉE,** of Dieppe school.
- SAILLOT,** of Dieppe school.
- ST. GOUIN.** Medallion probably by him in the British Museum.
- SANGER (SENGHER), PHILIPP,** of Nuremberg. Turner to Grand Duke Cosmo III of Tuscany.
- SALVIATI, GIUSEPPE.** Gem cutter active in Berlin at the end of the eighteenth century. Two reliefs, "Nymphs Bathing," in Königliches Museum, Berlin.
- SAMUEL, CHARLES.** Born in Brussels in 1862. Exhibited in Antwerp 1894, Brussels 1897.
- SCAILLAIT, ———.** Pupil of Moreau-Vauthier. "Phryne," statuette of ivory and silver, and relief, "L'Enfant et La Fortune," composition of Delaplanche, in Musée Galliera, 1903.
- SCELLEUR, JEAN LE.** Worked for the French King Philipp V, "Le Long," beginning of fourteenth century.
- SCHAUSS, MARTIN.** Born in Berlin, September 25, 1867. Statuette, "Cœur Dame" in Dresden Exposition, 1899.
- SCHEEMACKERS, PIETER, THE ELDER.** Born in Antwerp in 1640; died in Aven-donk, in 1714. Children playing, in Bavarian National Museum.
- SCHENCK, JOHANN CASPAR.** Died about 1673. After 1665, received 500 florins annuity as "Hof-Painstecher" (Court Bone Carver) in Vienna, the first to bear this title. Reliefs in Kunsthistorisches Museum, Vienna; "Christian Persecution," "Entry of Christ into Jerusalem," etc.
- SCHLÜTER, ANDREAS.** Architect and sculptor. Born in Hamburg, May 20, 1664; died in St. Petersburg in 1714. Did ivory work in his early years. Settled in Berlin in 1694 and was employed at the court of the Elector of Brandenburg. Statuette of Hercules in Königliches Museum, Berlin, may be by him and also a Hercules strangling the Nemean Lion.
- SCHNECK, JOHANN.** From the Tyrol. Born in 1724; died in 1784. Imitated Trojan. "St. Michael and Satan" in Hofmuseum, Vienna; the saint is of ivory and Satan of ebony.
- SCHÖNAUER, A.,** of Hamburg. Silver shield with Minerva's head in ivory.
- SCHULER, ———.** Statuettes "Adam" and "Eve" in Manchester Exhibition, 1857.
- SCHUBO, ———,** of Offenbach.
- SCHULZ, LEBERECHT WILHELM.** Born in Meiningen in 1774; died in 1864. Cups with hunting scenes; specimens in Grüne Gewölbe, Kunstgewerbe Museum, Berlin, etc.; also ecclesiastical vessels. Member of Berlin Academy.
- SEIBERT, ———,** of Geisslingen. Dolls' furniture; also vases.
- SEYSSSES, AUGUSTE.** Born in Toulouse. "Eléphants d'Afrique" in Salon, 1901; marble, bronze, and ivory.
- SHEFFER, E.** Anonymous portrait in Musée Galliera, 1903.

SIEBER, A., of Freiburg.

SIMART, PIERRE CHARLES. Born at Troyes, June 27, 1806; died in Paris, May 27, 1867. Celebrated as the creator of a chryselephantine Minerva 3 metres in height, executed for the Duke de Luynes and exhibited in the Paris Exposition of 1855; this aroused great interest at the time as a revival of ancient art.

SINDING, STEFANO. Born August 4, 1840, at Trondhjem, Norway. Statue, "Walküre," in bronze and ivory made for a Dresden connoisseur.

SOSSON, LUCIEN. Born in Paris. In Salon, 1905, "Du Guesclin," statuette in wood, bronze, and ivory.

SOUILLARD, JR. "Ajax," after the antique, in Musée Galliera, 1903.

SPANO, ANTONIO, of Naples. "Adoration of the Magi," in collection of Prince Lucien Bonaparte, dated 1555.

SPENGLER, LORENZ. Born in Schaffhausen in 1720. Came to Copenhagen in 1743 and died there as custodian of the art collection in 1807. Turning work; pyramids and temples adorned with reliefs, also figures with ornaments in ivory; portrait medallions. Many works in Rosenberg Castle Museum, Copenhagen.

STAPPEN, PIERRE CHARLES VAN DER. Born in Brussels, December 19, 1843. Pupil of Portaels. "Sphinx" in Brussels Exposition, 1897.

STOCKAMER, BALTHASAR. Died about 1700. Of Nuremberg. Employed by Grand Duke Cosmo III of Tuscany, and later in various German courts.

STRAUSS, BERNHARD. Born in Morchdorf on Lake Constance. Lived in Augsburg as goldsmith in the second half of the seventeenth century. Tankard in South Kensington Museum, London.

STROBEL, ———, of Geisslingen.

STRYMANS, ———. Snake charmers in Brussels Exposition.

STRUBER (STÜBER), ———, of Heidelberg.

TANADEI, ———. Italian ivory carver. Portrait of Alexander I of Russia in Paris Salon, 1829.

TERNISIEN, ———. Exhibited in Musée Galliera, 1903.

TEUBER, JOHANN MARTIN, of Regensburg, Bavaria. Eighteenth century. Turning work.

THEOKOSMOS. Executed head of Zeus statue at Megara

THOMASSON, THE ELDER, of Dieppe school. "Dante" and Pompeian fresco in Musée Galliera, 1903.

THOMASSON, THE YOUNGER, ÉMILE. Born in Paris. "Le Réveil" and "Sémiramis" in Musée Galliera, 1903; in Salon, 1906, bust of the President of the French Republic.

THRASYMEDES. Made ivory and gold statue of Asklepios at Epidaurus.

TIELKE, JOACHIM. Fine viola da gamba in Brussels Conservatoire, dated 1701.

TOMBAY, A. DE. Exhibited in Antwerp Exposition, 1894.

TORNIER, JEAN CONRAD. Inlaying work in Wallace Collection (1630.)

TORRE, PIETRO ANDREA. Died 1668. Lived in Genoa and made wonderful crucifixes. Nothing extant.

TRAUTMANN, ———, of Erbach school. Amorettes and animal figures.

TRIQUETI, BARON. Large figure of Bacchus in British Museum.

TROGER, SIMON. Born at Haidhausen near Munich; died about 1769. Gypsies and beggars in the style of Van Ostade's and Callot's etchings; reliefs, biblical and mythological groups, such as Sacrifice of Abraham in Grüne Gewölbe, etc. Ivory combs, the figures being of ivory and the garments or draperies of the sugar pine.

VADING, ———. In Vienna middle of seventeenth century. Spinning wheels, cups, etc.

VATON, CHARLES. In Salon, 1904, a wild boar, marble and ivory.

VALTON, CHARLES. Born at Pau. Pupil of Barye and Frémiet. In Salon, 1903, "L'hippopotame" and "La quête d'une bouchée de pain," bronze, onyx, ivory.

VAN DER STRAETTEN, GEORGES. Born in Ghent. In Salon, 1909, statuettes, "Mimi" in style of 1830, and "Rêverie" in Empire style; bronze and ivory.

VEDILLE, ———. In Musée Galliera, 1903, bas-relief, "Arrivée de la fiancée du Tzar" after Markowski.

VERHÛLST, ROMBAUT. Born in 1624; died in 1696. Executed a group, "Hercules and Cacus." Nothing of his extant.

VERNIER, ———. Medallions in Musée Galliera 1903.

VERSCHNEIDER, JEAN. Born in Lyons. In Salon, 1908, statuette, "Diabolo" in boxwood and ivory.

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VESCOVERS, JACOB FRANS. Born in the Netherlands; died in England in 1744. Was long active in Rome. Carved small figures and vases, which he sold so well in England that he settled there.

VEVER, ———. In Paris Exposition of 1889 "Pandora," of ivory combined with gold, enamel, and precious stones.

VIBERT, ALEXANDRE. Born at Epinay-sur-Orge. Pupil of Robert and Frémiet. In Salon of 1907, bust "Laure de Nives," of bronze and ivory.

VIGNE, P. DE. Exhibited in Antwerp Exposition, 1894; in Brussels Exposition, 1897, a head of Psyche.

VILLERME, JOSEPH. Of Saint-Claude (dept. Jura). Seventeenth century.

VINCKENBRINK, ALBERT. Born in 1600; died in 1664. Low reliefs, biblical and mythological figures. No work certainly known at present.

VINCOTTE, THOMAS. Sculptor. Born in Antwerp, January 8, 1850. Exhibited in Antwerp Exposition, 1894.

VINDERBRINK, ———. Born at Sperendam, Holland, in 1680. City sculptor in Amsterdam.

VITAL-CORNU, CHARLES. Born in Paris. Pupil of Jouffroy. In Salon, 1904, "Venus Victorieuse," statuette of ivory and precious stones.

VÖGTLE, A. W., of Esslingen. Exhibited in Paris Exposition of 1900.

VOYEZ, JEAN. Designed for Wedgewood about 1768.

VREUX, G. DE. "Aphrodité-Chrysis" in Brussels Exposition of 1897.

VUILLERMET. "Hercules struggling with Nemean Lion," in Musée Galliéra, 1903.

WAGNER, GEORGES. Born in America (Paris?). Pupil of Dumont. In Salon, 1903, "Princess Lointaine" and "Portrait de la Princesse L. de X.," statuettes in silver, ivory, precious stones, etc.; in Salon, 1905, four statuettes in bronze patiné and ivory, as follows: "Vierge à l'enfant," "Danseuse grecque," "Salomé," and "Phryné."

WALPURGER, J. B., of Berlin. Statuette of Frederick the Great with two greyhounds, 1824; evidently after group by G. Schadow.

WATSON, ———. Exhibited in Antwerp Exposition, 1894.

WEBER, of Heidelberg. Geisslingen school.

WECKHARDT (WECKHER), GEORG, of Munich. Called to court of Elector

Augustus of Saxony from 1578 as court turner. Cups, pokals, etc., in Grüne Gewölbe, Dresden. He seems to have then gone to Berlin, an artist of this name being mentioned as residing there in 1690; his sons remained in Dresden and worked for Elector Johann Georg I.

WEIGERLE, HEINRICH. Born at Schleerbach. Pupil of Franceschi. In Salon, 1908, "L'Invitation," statuette of bronze and ivory.

WEISSENFELS, H., of Dresden. Fauns and nymphs, "Morning" and "Evening."

WERNER, ———, of Heidelberg.

WERNER, J. H. Designed "Die Sonne"; court jeweller in Berlin.

WEYN, J. "Snake Charmer," in Brussels Exposition, 1897.

WILLMANN, PH., of Erbach school.

WINKLER, ———, of Fürth.

WOLFERS, P. H. Exhibited in Antwerp Exposition, 1894; also in Turin Exposition a "Juno" in ivory, silver, gilt, marble, enamel, and precious stones.

XAVERY, JEAN BAPTISTE. Born in Antwerp, March 30, 1697; died in The Hague, July 19, 1752, as court sculptor. "Faun and Fauness" shown in Retrospective Exposition at Amsterdam, 1883.

ZELLER, JAKOB. Probably of Deutz (according to another account he was a Hollander). Probably son of Pan-kraz Zeller of Regensburg, who was in the service of the Saxon court from 1583. In the Grüne Gewölbe there is a frigate of ivory dated 1620; on the keel is inscribed the genealogy of the Saxon reigning family; pedestal with Neptune and tritons; the rigging is of gold and the armament consists of 32 golden cannon. This work was valued at 3,000 thalers in 1654.

ZICK, DAVID. Died in 1777. Trinity rings cut out of a single piece of ivory. This type of ring was first made by Stefan Zick.

ZICK, LORENZ. Born in Nuremberg in 1594; died in 1666; son of Peter Lorenz. Taught Emperor Ferdinand III in 1643 in Vienna. Made pokals; then, his special invention, the so-called counterfeit boxes (on principle of Chinese magic balls) one within the other, from a single piece of ivory.

LIST OF IVORY CARVERS 509

ZICK, PETER. Died in 1632. Taught Rudolph II.

ZICK, STEFAN. Son of Lorenz Zick. Died in 1715. First maker of "Trinity rings"; also made artificial eyes and

ears, separable into their various parts, and other anatomical objects.

ZIERA, NICOLA. Sixteenth century.

ZIMMERMANN,———, of Munich.

NAMES OF CHINESE IVORY CARVERS*

HUNG CHING, of Canton.

national Exposition at San Francisco, 1915.

KWAN JUE of Canton.

LI HSAO-YU. Exhibited "Magic Balls" in the Panama-Pacific International Exposition of 1915, one of them consisting of 28 separately carved balls, one within the other. A silver medal was awarded him.

LIEN Yu-SUEN had an ivory group of eight horses in the Panama-Pacific International Exposition at San Francisco, 1915.

MOK YUK LENG, of Canton.

POON HOI, of Canton.

LIEN HSUN-HAO. Exhibited an elaborately carved tusk in the Chinese Section of the Panama-Pacific Inter-

Tso SHUE, Canton.

YOONG CHIN, of Canton.

*The names of the Cantonese carvers were courteously communicated by Consul-General F. D. Cheshire, of Canton.

OMITTED ON MAIN LIST

MARTINEZ, MANUEL R., of New York and Mexico.

NAMES OF JAPANESE IVORY CARVERS

A		I	
安部 Andō	阿部 Arikawa	一五子 Ichiryusai	一五子 Ieshinsai
		一无 Ikke	一守子 Ieshōsai
		一无子 Ikkesai	一守子 Ieshōsai
安部 Andō	安部 Anchin	一寛 Ikkan	一且 Ittan
安部 Andō		一室 Ipposai	一室 Iyo
		一真 Ieshin	
O		K	
如一 CHI Ichi	竹葉子 Chikuyosai	菊子 Kikuko	如葉 Jōsō
親考 Chikahide			
P		K	
在河 Furukawa		兼行 Kaneyuki	兼村 Kishimura
		加藤 Kato	无堂 Kōdō
		桂舟 Keishu	无延 Kōen
玩文 Ganbu	玉梅堂 Gokubaidō	菊少 Kikushō	无風 Kōfū
无子 Gokkōsai	玉堂 Gokudō	清明 Kōmei	无琳 Kōrin
玉明 Gokumei	玉園 Gokuyen	光山 Kōsan	无玉 Kwōgioku
玉子 Gokusai	玉山 Gokusan	宽玉 Kwangioku	无玉 Kwōgioku
玉真 Gokushin			
M		M	
伯實 Makujitsu	宝实 Hōjitsu	前島 Masajima	明玉 Meigoku
伯真 Makushin	宝堂 Hōkudō	心秀 Masahide	明雄 Meikōsai
考安 Midayasu	宝明 Hōmei	心廣 Masahiro	明子 Meisai
弘明 Kiro-aki	芳氏 Hōmin	雅子 Masako Ogura (miss)	
芳文 Hōbun	宝氏 Hōmin	政通 Masamichi	明子 Meisai
芳堂 Hōdō	宝子 Hōyosai	心直 Masanao	明子 Meisai
芳一 Hō Ichi		政信 Masanobu	道成 Michinari
		政重 Masachige	民谷 Minokoku
		心友 Masatomo	无明 Mitomaki
一氏 Ichimin	一五子 Ichiryusai	心俊 Masatoshi	无心 Mitomasa
一子 Ichiriosai	一敬 Ichirio	明重 Meidō	无一 Mitoku

NAMES OF JAPANESE IVORY CARVERS

元祖	Nitsuo	宗廣	Munehiro	真子	Shinsei	俊厚	Shungetsu
元利	Nitsutoshi	宗正	Munemasa	真舟	Shinsu	俊元	Shunke
宮本	Miyamoto	宗信	Munenobu	持心	Shisumasa	俊芳	Shunkwaiesai
茂木	Mogi	宗則	Munenori	持康	Shisuyasu	俊宗	Shuraku
宗房	Munefusa	宗高	Munetaka	持重	Shodosei	杖心	Shusei
宗春	Muneharu	宗行	Muneyuki	心民	Shomin	舟山	Shusan
				杖月	Shugetsu	宗奇	Soju
				杖玉	Shugioke	宗明	Sōmei
				杖元	Shuko	宗成	Somin
				杖明	Shumei	宗明	Sue-aki
				杖民	Shumin	敏本	Susaki
長元	Nagumitsu	信秀	Nobuhide	高友	Takatomo	友志	Tomotada
南元	Nanke	信義	Nobuyoshi	玉雄	Tamoo	友利	Tomotoshi
南宗	Nanso	則元	Norimitsu	定山	Teisan	俊明	Toshi-aki
信明	Nobnaki	則実	Norieano	重重	Terushige	俊親	Toshiehika
信親	Nobuchika			望碧	Tohekide	俊方	Toshikata
				望旭	Tekiokukun	俊心	Toshimasa
				吐元	Tokoesai	利元	Toshimitsu
				得子	Tokuesai	利実	Toshisane
				高秀	Tomihide	豊吉	Toyoyoshi
				友親	Tomochika	吐山	Tosan
				上山	Ueyama	植村	Uemura
				渡辺	Watanabe		
貞家	Sadamu	清舟	Seisho				
真雄	Senseo	仙安	Senkoku	山岸	Yamagishi	義一	Yoshi-ichi
晴祖	Seiga	芝山	Shibayama	安廣	Yasuhiro	義利	Yoshitoshi
正宝	Seiho	重規	Shigeehika	英玉	Yeigioke	祐宗	Yūjō
清一	Sei-ichi	重吉	Shigeyasu	英山	Yeisan	行秀	Yukihide
清江	Seiji	島村	Shimamura	茂明	Yoshi-aki	行友	Yukitomo
清花	Seikwa	真孝	Shinkosai	義久	Yoshikusa		

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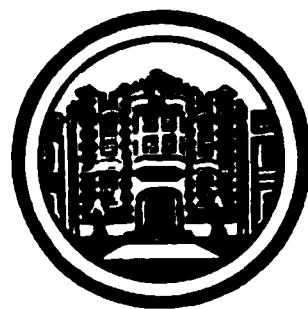
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